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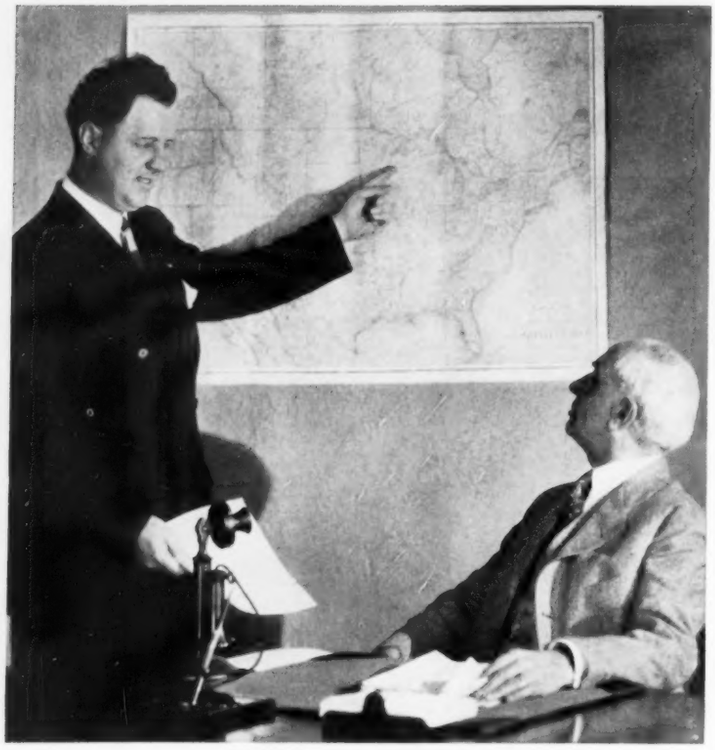

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STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

For forty-eight years—IRON TRADE REVIEW

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As the Editor Views the News

FEDERAL legislation which attempts to establish controls for the price policies of industry immediately becomes the concern of producers, distributors, consumers and the general public. Therefore a bill such as that introduced Thursday by Senator Wheeler (p. 14) to abolish the basing point system now employed by several important industries deserves close scrutiny by the most competent representatives of the four interested groups. Will it cure present alleged evils, or make them worse? Is it in the public interest? How will it affect consumers? Will it fulfill the avowed desire of its sponsor "to restore price competition to American business?"

• • •

The answers to these questions should be considered carefully by members of congress in their deliberations over the Wheeler bill.

Need Industry's Help on Policy

Conscientious congressmen realize that competent answers cannot be supplied by anybody in Washington. They know that the information from which the correct answers can be derived must come from the field of trade and industry. They say frankly that they need the help of progressive leadership in industry (p. 29) to solve this problem. The Wheeler bill is but one sign of the undercurrent of determination in congress to amend the antitrust laws. Industrial leaders must get into this picture in a big way!

• • •

The senior senator from Montana picked a particularly inauspicious time to revive the issue of price competition.

Isn't Rivalry Keen Enough?

He places great emphasis upon the necessity of "restoring" competition, as if to imply that competition is absent under the present system. Any person who has even a rudimentary knowledge of iron and steel markets, knows that the competition today probably is keener than it has been at any time in a decade or more. It is difficult for this writer to conceive of any price system that would induce or permit a greater degree of free rivalry among competitors than that which is being demonstrated right now (p. 69) in the markets for finishel steel. We doubt if the Wheeler proposal will help matters materially. In our opinion, full publicity on all price transactions is the best guarantee against monopolistic practices.

• • •

Two anniversaries stand out prominently in the week's news. Members of the Electrochemical society observed the fiftieth anniversary of the discovery by Charles Martin Hall (p. 19) of the electrolytic process for reducing bauxite—the start of the aluminum industry. Aluminum, both in a complementary and a competitive relationship to the ferrous metals, has won an important place in industry. . . . The skyscraper, which an eminent British authority declares is "essentially American" and this country's "greatest contribution to world development," also is celebrating its golden anniversary. The 5000 tall buildings in the United States (p. 16) stand as an impressive monument to the successful application of steel to the art of building.

Two Golden Anniversaries

• • •

Heavier purchases by the railroads, an improvement in awards of structural steel (p. 69) and a more cheerful outlook for profitable operations in the first quarter (p. 30), tend to inspire confidence in the iron, steel and metalworking industries. Wall Street seems to have sensed the new spirit of enterprise, and at the moment it apparently is engrossed in appraising the significance of the more aggressive policies (p. 15) pursued by United States Steel. It must be apparent to all observers that scores of corporations have thrown overboard every lingering vestige of depression lethargy and today are preparing to go places. This is the most hopeful sign of recovery we have seen to date.

Aggressiveness Is Good Sign

E. L. Shaner

Antitrust Law Amendment Hits Steel Price System

Complete text of Wheeler anti-basing point bill on Page 68

THE steel basing point pricing system was thrown into politics Thursday when Sen. Burton K. Wheeler, of Montana, and Rep. Hubert Utterback, of Iowa, both Democrats, introduced identical anti-basing point bills in the senate and house.

These bills, in brief, would amend existing antitrust laws to provide:

(1) It shall be unlawful to make any charge for freight other than actual cost of delivery.

(2) No contract may be made in which the price shall be computed on any freight charge other than that actually paid.

(3) A delivered price may not be quoted without specifying what portion is represented by actual freight and without giving the buyer the option of accepting delivery f.o.b. the producing plant.

The Wheeler bill was referred to the senator's own powerful committee on interstate commerce. The Utterback bill has been referred to the house judiciary committee, of which Rep. Hatton W. Sumners, Democrat, of Texas, is chairman.

Action on Measure Unlikely

Presumably hearings will be held shortly, but in view of the desire of both congress and the administration to adjourn this session early, it seems unlikely that the measure will pass unless placed on the administration's "must" list of legislation.

While aimed primarily at the steel industry, by inference all similar pricing methods on all other products would be outlawed. Prompting this attack on steel is the conviction of the liberal group in Washington that the present method of quoting steel at various basing points eliminates price competition.

On introducing his antibasing point bill Senator Wheeler said Thursday:

There is little doubt of the facts as to these practices which are known, not only as "basing point" methods of pricing, but also, in some industries, as "zone" or "freight equalization" methods.

All of them substitute for competitive prices some formula under which any seller can tell in advance that every other seller's delivered price is going to be identical with his own for any given delivery point. The price is always a delivered price and a product of a formula unless, in rare instances, some member of the industry breaks the understanding and departs from the system, or makes a clerical error in figuring the freight rate.

Practices varying in detail but the same in principle and in their effect on competition are going on in various industries including steel, pig iron, cement, lumber, sugar and others.

There are many results—one of them is that the industrial interests often gain the exclusive benefit of cheap transportation since the basing point systems take into account the freight rates of railroad transportation. Frequenly the manufacturers, if they can save any money, deliver by waterways and highways improved through federal funds. The benefit of the cheaper transportation brought about by public expenditures, however, does not go to the buyers of the products of these industries.

Another result is that manufacturers in these industries place their base prices high enough so that they can secure, as witnesses for the steel industry recently stated on the stand, nation-wide distribution. This nation-wide distribution is secured for every plant regardless of its geographic location. Manufacturers ship their products to the distant parts of the country, delivering them beyond the mills and factories of their "competitors."

Under these systems manufacturers do not compete in price but each has the benefit of entering the market territory of every other supposedly competing concern: all quoting one price for each market location and no one making a competitive price by departing from the formula.

But even the payment by the public of noncompetitive prices is not the worst public evil of these schemes. The scheme tends to fixing constantly increased prices.

There were various major causes of the great economic depression of the early thirties. The huge debt structure incurred by both agriculture and industry, the over capitalization of industrial companies and other causes have contributed to its origin and to its extended duration as contrasted with other depressions.

There is in time of depression a constantly growing tendency to maintain prices in the face of decreased demand in order to earn interest on debts and to pay dividends on stocks not based on the amount of money actually invested. The resort to such price fixing practices is one of the most important causes of the recent depression and of its unparalleled duration.

Pegged Prices Slow Recovery

Lowered prices in prior depressions have been advantageous because they have fostered the buyer's comeback and enabled more men to be put to work as a result of his renewed buying. In this depression, however, price-fixing schemes and particularly basing-point systems, probably in part induced by the load of fixed debt resulting from integration and mechanization, have so pegged prices of many important commodities, that the usual depression reductions have not prevailed. Accordingly, the purchasing power of the public has been slow in making its upward turn. Instead of price competition bringing back the public to the market and thus setting the idle to work, we still have something like 10,000,000 workers out of jobs.

I have introduced the anti-basing point bill largely for the reason that unless the situation can be taken in hand and price competition restored to American business the country will barely escape from this depression before it will be submerged in another which may be more disastrous than that from which we are now emerging.

There is no substitute for competitive prices. If each industry is allowed, through basing point systems and other price fixing devices, to obtain something like a franchise to charge the public what it will, there will be a public upheaval through the stress of high prices and unemployment.

The public would thereupon insist that the government police prices to make them reasonable. A representative Government is not capable of price fixing and can not stagger under

(Please turn to Page 68)

Basing Point Chronology

September, 1908—Informal complaint made by Birmingham consumers because United States Steel Corp. sells "bars and plates on a Pittsburgh price basis."

Sept. 1, 1917—War industries board established Chicago base price on plates, shapes and bars.

July 1, 1918—War industries board abandoned Chicago base and restored Pittsburgh base.

Jan. 24, 1919—Western Association of Rolled Steel Consumers organized.

July 9, 1919—At suggestion of Judge Gary, representatives of Western association met with him before federal trade commission at Washington.

Aug. 1, 1919—Western association filed application for complaint against United States Steel Corp., Inland Steel Co., Interstate Iron & Steel Co., and Steel & Tube Co. of America, on ground that Pittsburgh-plus violates Section 5 of the federal trade act and Section 2 of Clayton act.

April 30, 1921—Federal trade commission issued complaint against United States Steel Corp. and subsidiaries.

March 4, 1922—Commission filed second amended complaint, after which testimony was taken at many points throughout United States.

July 23, 1924—"Cease and desist" order issued by federal trade commission.

Sept. 23, 1924—"Cease and desist" order in force and accepted, Chicago, Birmingham, Ala., Duluth, and many other cities being made basing points.

Aug. 17, 1933—NRA steel code in effect, greatly broadening basing point system.

Feb. 2, 1934—Senate adopted Borah resolution asking federal trade commission to investigate price practices of the steel industry under the NRA code.

Feb. 19, 1934—Consumers advisory board of NRA proposed elimination of basing points and adoption of universal mill basing points.

March 19, 1934—Federal trade commission reported to senate that steel code, while increasing the number of basing points, still permitted monopolistic practices.

Feb. 20, 1936—Wheeler-Utterback anti-basing point bill introduced in congress.

New Personnel, Policies Basis Of Rise in Steel Corp. Stocks

New York

AFTER a long lapse, Wall Street again sees speculative possibilities in United States Steel Corp. shares.

On Feb. 1 the closing quotations were 48½ on common and 118 on preferred. On Feb. 18 the high and closing prices were 65 and 130. Since then there have been slight fluctuations, the close on Feb. 21 having been 63½ and 127¾, respectively. In other words, the advance is being quite firmly maintained.

As recently as a month ago there was considerable short selling of Steel corporation stock. At the same time there was a considerable buying wave which involved shares of a number of steel companies, particularly Bethlehem.

Short Interest a Help

The Wall Street attitude toward the Steel corporation has changed greatly in the intervening weeks, with increased buying which disclosed a rather substantial short interest in Steel common. This helped to change the technical position of the stock, in that short covering acted as a prop which has prevented any marked tendency toward minor recessions during the upward swing.

However, the real reason for the movement appears to be a general belief that the Steel corporation management is on the eve of taking action which will have the effect of wiping out accumulated dividends on the preferred stock. It definitely has been known for some time that it has had under careful study the matter of the back dividends. The accumulated dividend due as of Dec. 31, 1935, was $58,545,678, on the basis of $16.25 per share.

The 7 per cent dividend on the preferred was reduced on Jan. 31, 1933, to 2 per cent a year, or ½ of 1 per cent per quarter and this rate has been maintained to the present time. Whether the recently improved earnings of the Steel corporation presage any increase in this rate no indication yet has been given.

In any event, Wall Street believes it illogical to expect that the $58,545,678 back dividends will be paid in cash, and particularly in view of the large expenditures which the Steel corporation now is making, and which it undoubtedly will continue to make, on plant rehabilitation and improvement. Rather, the stock market feeling is that a plan of refinancing which would wipe out the accumulated dividend automatically would bring the common stock closer in line for distribution of earnings.

Too, there has developed a much more optimistic feeling in financial circles as to the future in general. The rate of steel production has moved upward and is expected to continue to follow this general trend. The Steel corporation's history in respect to dividends on common stock is recalled as having been very good.

The last payment, at the rate of 50 cents a quarter, was paid as recently as for the first quarter of 1932. The rate for the last half of 1931 was $1 per quarter. For many years previous the stock had been on a $7 annual basis.

It is considered as not unlikely that with the return of prosperity it may require a much shorter time than recently thought possible or probable before the Steel corporation again is able to take care of common stockholders.

It is of interest to note that the Wall Street attitude toward United States Steel, as it has crystallized during the past month, has improved greatly. In stock trading circles it is felt that the many personnel changes made by the Steel corporation have brought young and aggressive men into many high positions.

It is believed that the large sums spent in general modernization, and particularly in the development and production of alloy and high strength steels and in the production of sheets and strip, which products are expected to enjoy increasing demand as conditions improve, will prove profitable.

The more aggressive sales promotional job, accompanied by an impressive advertising campaign, is regarded as significant. In short, Wall Street believes that the Steel corporation is on the way toward resuming its former pre-eminent and dominating position in the steel industry.

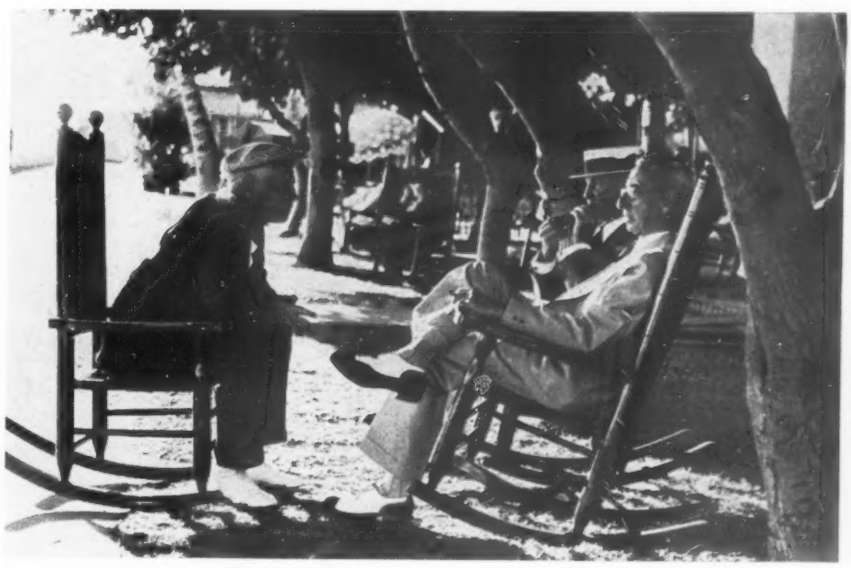
Change to Operating Company?

Another development which has impressed financial circles is the willingness of the Steel corporation to throw time-honored traditions to the winds. The reorganization which has resulted from the combination of the Carnegie and Illinois companies, for instance, is regarded as evidence of an elastic and flexible disposition in meeting new conditons.

Considerable speculation is heard as to the possibilities of moves of this nature in the future. Opinion is expressed in many quarters, for instance, that the Steel corporation eventually will terminate its existence as a holding organization and be succeeded by an operating one.

Wall Street sentiment is consistent only in that it blows hot or cold with equal facility. For the present it may be said that the speculative activity which is marking up prices on United States Steel stocks is grounded upon what Wall Street regards as sound speculative principles.

Probably Talking Shop



The coldest winter in years has no terrors for J. C. Williams, president of the Weirton Steel Co., at the left, and Charles M. Thorp, director of the National Steel Corp., of which Weirton is a subsidiary, in the right foreground. The scene is the garden of the Royal Hawaiian hotel, Waikiki

Skyscraper Born 50 Years Ago; Raised on Steel

BY V. G. IDEN,
Secretary, American Institute of Steel Construction Inc.

IT IS an interesting fact that the revival of building construction should come at the time the skyscraper is celebrating its fiftieth anniversary.

While there may be disputes as to when the first skyscraper was built it is generally agreed its birth was some time in 1885-1886. The difficulty of establishing the actual date arises from the fact that the complete adaptation of the curtain wall and frame construction was not utilized throughout the first buildings in which it was initiated.

The use of metal as a structural member in a building antedated this. The first recorded application in England was in 1801, when Messrs. Phillips & Lee, of Manchester, used beams and columns of cast iron in a fireproof building for a cotton mill. Rolled structural sections were a later development. Their first building destroyed by fire, Harper & Bros., New York publishers, rebuilt in 1854, using cast iron columns for supports in the wall.

A rolled beam of H sections was exhibited at the Paris exposition in 1855. These probably were rolled by Zores of Paris, who in 1849 produced a wrought iron joist section 5½ inches deep. In carrying out alterations to buildings erected in London between 1870 and 1880 there were many examples of wrought iron rolled joists and built-up girders, but at that time it was the usual practice to support these joists and girders upon brick walls and interior cast iron columns.

The first wrought iron joists rolled in England were in 1860. Wrought iron beams and columns were used in buildings for the Centennial exposition in Philadelphia in 1876. By that time iron was beginning to be a fairly common building material.

Quick Change to Steel

The first steel joists were rolled in 1885 by Dorman, Long & Co. at Middlesbrough, England. Rolled steel sections were available in the United States about the same time, 1884, and steel, because of their superior qualities for construction, completely displaced wrought iron.

There have been many conflicting claims as to the first person to build the curtain wall. Several engineers claim to have taken out patents upon this method of construction which was later recognized as the skyscraper type of building. M. Saulnier, a French architect, is said to have designed the first "frame building" in 1873. It was in the United States, however, that this method of construction received its first application, according to later claims, and enjoyed its most extended development.

In the fall of 1883 William LeBaron Jenney was commissioned by the Home Life Insurance Co. of New York to design a Chicago office building for the company. It was in this that he dared to do what others had

1886-1936

FIRST use of structural steel in a modern building generally is accredited to William LeBaron Jenney, who designed the Home Life Insurance building in Chicago 50 years ago. This structure, left, was started with wrought iron beams, and before completion, bessemer steel beams were used. It was originally ten stories high. Compare with the Empire State building, right, 89 stories high

never dared, namely, to take the dead load off its walls and place it upon a skeleton framework concealed within the masonry.

One morning when the framework had reached the sixth floor he found a letter on his desk from the Carnegie-Phipps Co., Pittsburgh, stating that it was then rolling bessemer steel beams and would be glad to substitute them for wrought iron beams in the remaining floors. Jenney agreed.

This was the first use of structural steel in a modern building. It was erected at the corner of LaSalle and Adams streets, Chicago. This building was orginally ten stories high, begun in the spring of 1884, and finished in the fall of 1885. Two more stories were later added to the building, 1890-1891.

A year after the completion of the Home Insurance building, 1886, the 12-story Rookery building, designed by Burnham & Root, copied the Jenney skeleton framework, but improved on its foundations.

First Curtain Walls

A year later, in 1887, Holabird & Roche, in collaboration with Purdy & Henderson, bridge engineers, designed the 14-story Tacoma building, Chicago. The outer walls of this building on the two street frontages were purely curtains of brick and terra cotta, carried to each floor by steel spandrel beams attached to cast iron columns. For once, men and women passing in the street below had good cause to look up and stare. They were seeing, for the first time, the startling spectacle of bricklayers beginning to lay walls midway between roof and ground.

The Home Life Insurance building was part iron and part steel. When this building was demolished in October, 1931, quite a controversy arose over the claim that it had curtain walls only in part. It was, however, really the forerunner of all modern skyscrapers.

Had it been the first skyscraper it would have marked the birth of skyscrapers, and dated that birth with the year 1885, the year the building was completed. Probably, as a matter of accuracy, it would be better to claim that the skyscraper was born with this building, and therefore in this year, 1936, we are celebrating the first half century of its birth.

Another who claimed to have invented the skyscraper was Leroy S. Buffington, engineer and architect. Buffington claims to have drawn his first perspective of a 28-story skyscraper in 1882. He filed his patents Nov. 14, 1887. Later the Buffington Iron Building Co. was formed to further the interests of the Buffington patents. Suits for infringement were started in 1894 in the United States circuit court. All appeals and ten suits later were prosecuted in New York. They cost Mr. Buffington $30,000, and dragged on so long that the patents ran out.

In the Home Life Insurance building the spandrel beams rested on the brackets of the exterior cast iron columns and the ends of the spandrel beams connected across the columns by strap anchors. An exterior column was uncovered on the fifth story of this building in January, 1924, and the spandrel girder, its support and connection were found as shown by the original drawings.

Others Quick To Follow

The 14-story Tacoma building was designed along lines similar to the Home Life Insurance building. This was followed by the erection of the all-steel frame first Rand, McNally building in Chicago, the 20-story Masonic Temple, and the 17-story Ashland block built in Chicago in 1892, and the 11-story Tower building erected in New York in 1889. This was the first generation of the modern tall building.

Jenney and Buffington were but two of the builders with vision. Daniel H. Burnham, John W. Root, William Holabird, and a good number of skyward-looking builders were to follow, among them the late Col. W. A. Starrett of more recent achievement.

The first bessemer steel beams ever used in buildings were those which appeared in the framing upon the sixth floor of the Home Life Insurance building. Therefore, some authorities have claimed that this building is not only the first skeleton frame building, but it also is the first building in which were used rolled steel sections.

When the Home Life Insurance building was demolished in 1931 the owners appealed to the professional societies to determine definitely whether or not it was the first skyscraper, as by that time records had not been preserved and it was impossible to obtain the design data upon which it was originally constructed.

This committee followed carefully the building's demolition and came to the conclusion that it was the first high building to utilize as the basic part of its design the method known as skeleton construction. Also, that there was convincing evidence that Major Jenney, in solving the particular problems of light and loads appearing in this building, discovered the true application of skeleton construction and the building of high structures, and invented and here utilized for the first time, its special forms.

Race for Height Started

The Singer building, erected in 1908, was probably the first of the tall buildings to receive international fame. The height of this building, however, was superseded by the Metropolitan Tower in Madison Square almost immediately in 1908, and that was again exceeded by the Woolworth building, designed by Cass Gilbert in 1912. In the meantime the L. C. Smith building, 42-stories high, had been erected in Seattle.

The Woolworth held its record as the tallest building for about 17

SHORTLY after completion of the Home Life Insurance building, Chicago, see page 16, the Tacoma building, Chicago, "soared" into the sky, to a then unprecented height of 14 stories. Curtains of brick and terra cotta were carried to each floor by steel spandrel beams. This was the first time that building construction afforded the "startling" spectacle of bricklayers beginning to lay walls midway between ground and roof

years, when the Bank of Manhattan building was started in New York, and the Chrysler building in the same city. The owners of these two buildings, which were being erected at the same time, indulged in some rivalry as to which should be the taller, the Chrysler building finally winning out, but its fame was only short-lived because the Empire State building was erected in 1931, towering to a height of 1250 feet above the sidewalk.

Skyscrapers were rapidly adopted by all of the important cities of the country. A survey made in 1929, covering 173 cities having a population of 50,000 or more, showed that 36 had one or more buildings over 20 stories in height. The survey also showed that there were 4778 buildings ten stories or more in height, of which 377 were over 20 stories high.

In a steel frame building the columns are continuous and carry the whole of the loads transmitted to them from floor beams. As the walls serve only for protection against weather and temperature and for partitions, they can be thin from top to bottom, and buildings of great height can be erected without the additional weight and space of massive masonry.

British Sections Standardized

In England prior to 1904, when rolled steel sections were standardized, the various manufacturers had each their own particular sections, and it was difficult to design without specifying sections of some firm. Standardization of the sections produced a great simplification in the work of design and did much to extend the use of steel construction in that country. In 1920 the British Engineering Standards association issued the "New British Standard Sections."

Steel frame buildings were not very well known in England before 1909, however, when provision was made for them in the London county council general powers act, which allowed reduction in the wall thicknesses specified by the London building act of 1894.

In 1923 the London county council obtained power to modify the requirements of the 1909 act, and it was not until then that some of the economies that had been introduced in the United States were adopted.

A concerted effort to standardize weights and shapes of American sections was made in 1920 when the American Institute of Steel Construction was organized. At that time a standard specification also was advanced which has since been adopted by nearly all of the building codes in the United States. Through the influence of this institute, American mills have finally adopted a complete standardization of all sections.

The use of cast iron columns was customary for 20 years after the first built-up wrought iron columns were made in 1870. For buildings up to four stories in height the cast iron column is entirely satisfactory, but in tall buildings requiring columns in two story lengths and those that will resist bending stresses, they are not suitable. The 16-story Unity building in Chicago, 210 feet high, was built with cast iron columns resting on floating foundations. The wind bracing was made with turnbuckled, wrought iron rods, diagonally connecting to bottom and top the adjacent columns. Although this building settled along one side so as to throw it out of plumb very noticeably, it was jacked back into its original position and the floating foundations replaced with caissons.

Phoenix Shape Supplanted

The original built-up column, the Phoenix shape, was used for 30 years. Its section was ideal from a mathematical standpoint but it was extremely difficult to detail for beam and girder connections. It was supplanted by the Z-bar and Gray columns which had a vogue until the latticed channel, channel and plate, and the plate and angle columns were invented. The invention of the Z-bar column, however, was the most marked event in column design and from it were developed better and more economical types.

The first handbooks of the early and mid-eighties were based entirely on wrought iron shapes with beams and channels up to 15 inches. The tables of safe loads were based on a 12,000-pound fibre stress. When the bessemer steel shapes were first commercially manufactured in 1884 the tables of safe loads for them were based on a 16,000-pound fiber stress. Although the cost of steel shapes was greater than that of wrought iron shapes, the differential was offset largely by the increased strength of 33.3 per cent.

In 1891 open-hearth steel shapes were rolled and today practically all steel shapes are made of this kind of steel. Up to 1894 the rolling mills produced steel and wrought iron shapes, at which time the making of wrought iron shapes was discontinued.

The end of the World war intensified the building shortage that had accumulated in the United States during the four years of strife. The economy of steel construction was an added incentive to the great increase in building and by 1929 this volume of construction had increased so rapidly that it was then consuming steel at the rate of approximately 2,000,000 tons a year.

The invention of the Gray mill, upon which the Bethlehem Steel Co. rolled the first of the wide-flanged sections, lent a new economy in structural steel design. With the growth of technical knowledge in the melting of iron, the making of steel and the rolling of structural shapes, the mills began to exercise an improved control over the product. A greatly improved steel was made. As a consequence the first result of the co-operative efforts of the American Institute of Steel Construction was to increase the working stress in such steel to 18,000 pounds per square inch. The first building codes had limited it to 16,000 pounds. In the past year, now that even greater improvements have been made in quality, the standard specification has been increased to 20,000 pounds.

The elevator also has made the tall building a practical structure by affording a quick and easy access from the street level to the upper floors. By harnessing electrical energy, their acceleration can be automatically timed to the fraction of a second and speeds of 1700 feet per minute attained.

One of the earliest elevators known was that installed in the ornate old Fifth Avenue hotel in New York in 1859. It was built by Otis Tufts and cost $25,000. A steam engine ran it by turning an immense vertical screw; hence the name, vertical screw railway—as a nut is moved up and down on a bolt by turning the bolt. The first suspended elevator, the forerunner of the kind we know today, was installed seven years later in the old St. James hotel, New York.

Born in Nation's Steel Mills

The invention of elevators, however, did not make possible the tall building; neither did the improvements in the utilization of electrical energy, nor the discovery of the principles of air-conditioning. The tall building is the direct outgrowth of the application of steel to the art of building. The rolling of structural shapes, their standardization, and the application of tested engineering principles of design made the skyscraper.

A prominent British authority, Alfred C. Blossom, Fellow of the Royal Institute of British Architects, has said: "The skyscraper is an essentially American form of architecture and were the United States to end tomorrow, this type of structure would probably be handed to posterity as that country's greatest contribution to world development."

Schwab, at 74, Still an Optimist

CHARLES M. SCHWAB celebrated his seventy-fourth birthday on Feb. 18 by acting as informal host to a delegation of newspapermen who visited him at his office at 25 Broadway, New York.

Punctuated by a barrage of flashes from the camera men, his remarks dealt with his 56 years in the steel industry. Much of his present happiness, he said, lies in the recollection of his experiences and of the men with whom he has been associated in that industry.

Mr. Schwab's appearance betrayed no effects of the ill health from which he suffered most of the past year.

The chairman of Bethlehem Steel Corp. expressed deep gratification over the special master's report, Feb. 7, which found that there was no basis for the government's charges that Bethlehem had made "unconscionable profits" on its shipbuilding contracts during the war.

He smiled whimsically when he recalled that munitions makers during the war were the most highly prized citizens because they were powerful and could make the things necessary to win the war. It was only later, he said, that there developed in some minds a suspicion that there may have been something opprobrious about their conduct.

Lauds Individual Initiative

Despite the bad five years through which he has gone, said Mr. Schwab, he is an optimist for the future. But the outlook for the social well-being of our entire population depends on the continuance of freedom for individual initative in developing the economic resources of the country. On no other basis can successful industries be erected, he maintained.

He declared that it is commendable for an individual to want money. The recent reduction in compensation under the Bethlehem incentive plan, he explained, resulted from feeling on the part of stockholders and the public, and reflected Bethlehem's disposition to defer to the views of the public in matters of policy. But Mr. Schwab still feels personally that it is desirable to put incentive payments on as liberal a basis as possible.

He spoke of the extent to which industry has contributed to solving the problem of unemployment, in such ways as devising share-the-work schedules and the donation of large contributions. The real cure for unemployment lies in the development of new business. If enterprise is encouraged, he said, better times are not far ahead.

The depression, he declared, revealed a determination on the part of business management to meet the situation in the best and most courageous way possible. During the darkest days there were such developments as complete redesigning of automobiles, introduction of streamline trains, the rise in aviation, development of radio, the new processes and extensive building in the steel industry. All these came at a time, declared Mr. Schwab, when one needed to believe in the future of this country if these things were to be worthwhile.

Aluminum Industry Marks 50th Year

FIFTIETH anniversary of the founding of the aluminum industry was observed by the Electrochemical society at a dinner in New York, Feb. 17, attended by representatives of the aluminum industry and of leading scientific, engineering, and chemical societies.

It was in 1886 that Charles Martin Hall, then a 22-year old student at Oberlin college, Oberlin, O., discovered the electrolytic process for reducing bauxite. The dinner commemorated the twenty-fifth anniversary of the award to Mr. Hall, who died in 1914, of the Perkins medal in honor of his achievement.

Speakers included Dr. Francis G. Frary, director of the Aluminum Research Laboratories, and past president of the Electrochemical society; Arthur V. Davis, chairman of the Aluminum Co. of America; Dr. Frederick M. Becket, of the Union Carbide & Carbon Corp., New York; Dr. Alexander Klemin, director of the Guggenheim School of Aeronautics, New York university, and Homer H. Johnson, Cleveland attorney and one-time classmate of Mr. Hall.

Reviews Early History

Doctor Frary recounted the history of Mr. Hall and his search for a low-cost method of producing aluminum, pointed out that his original method is still in use, and cited that the production of aluminum increased from 14 metric tons in 1886 to 281,615 tons in 1929, a figure which probably will be exceeded this year.

Other Perkins medalists at the dinner included Dr. E. C. Sullivan, vice chairman, Corning Glass Works; Dr. George Oenslager, chemist, B. F. Goodrich Co.; Dr. G. Colin Fink, professor of electrochemistry, Columbia university; Dr. George O. Crume Jr., director of research, Carbide & Carbon Chemical Corp.; Dr. F. G. Cottrell, inventor of electrostatic precipitation; Dr. M. C. Whitaker, consulting chemist, American Cyanamid Co., and Dr. Charles F. Burgess, president of the C. F. Burgess Laboratories.

Coast Fabricators Elect; Hit Prices

ANNUAL meeting of the Pacific Coast Steel Fabricators' association, an organization formed one year ago and including in its membership the principal structural and plate fabricators of California, Oregon and Washington, was held at the Hotel Del Monte, Del Monte, Calif., Feb. 7, in connection with the Iron, Steel and Allied Industries of California conference.

All officers and directors who served in 1935 were re-elected for 1936, including Reese H. Taylor as president, who is also president of Consolidated Steel Corp., Los Angeles; and these vice presidents: Paul Pigott, of Pacific Car & Foundry Co., Seattle; George Ritt, of Steel Tank & Pipe Co., Berkeley, Calif.; and Charles McGonigle, of Poole & McGonigle, Portland, Oreg. P. F. Gillespie, of Judson-Pacific Co., San Francisco, was re-elected secretary and treasurer.

The following directors were also re-elected: Howard Tallerday, president, Western Pipe & Steel Co., San Francisco; Joseph A. Moore, president, Moore Dry Dock Co., Oakland, Calif.; T. L. Hanning, of Steel Tank & Pipe Co. of Oregon, Portland; C. A. Shafer, of Garrett & Shafer, Seattle; John A. Stever, of National Tank & Mfg. Co., Los Angeles; and C. F. Bradburn, of Pacific Iron & Steel Co., Los Angeles.

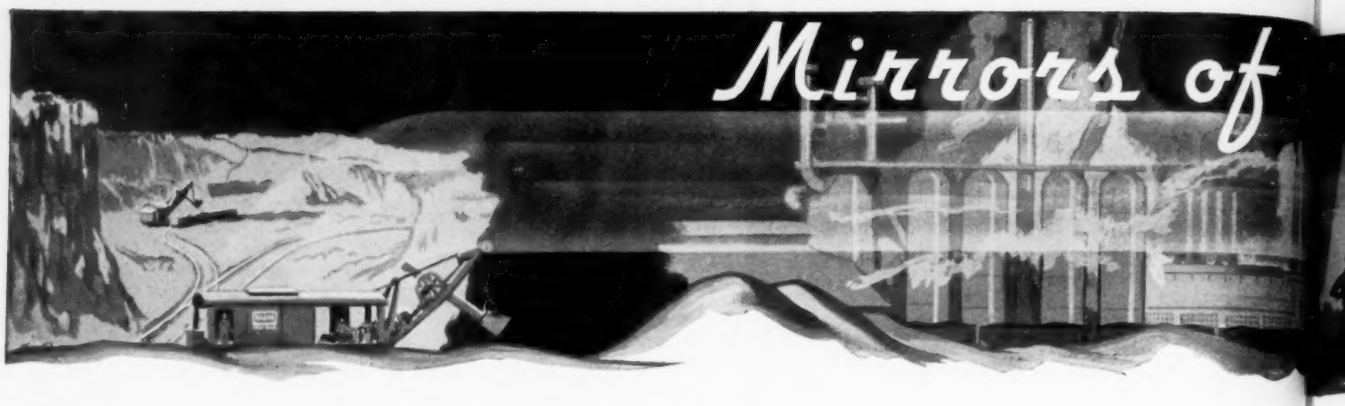
Oppose High Differentials

T. A. L. Loretz, of Los Angeles, will continue as assistant secretary and manager. The association reiterated its position as opposed to:

(1) The alleged unreasonably high differential between eastern and Pacific Coast mill prices of plate, shapes and bars, and

(2) The granting by the mills of excess "equalizing" allowances to eastern fabricators doing business in the Pacific Coast territory.

It also went on record as favoring a $4 per ton price differential or allowance to recognized fabricators in this territory, similar to the allowance now provided for reinforcing steel jobbers, and further passed a resolution directing the assistant secretary to prepare a formal complaint for filing with the federal trade commission attacking "the allegedly artificially high mill base price of such bars, shapes and sheets as are produced in Pacific Coast rolling mills."



DETROIT

WITH the country now in its third month of paradise for coal dealers, Detroit begins to think that the automobile industry isn't doing so badly to hold to around 70,000 assemblies each week.

That's a crippled rate for February, but look how many communities today are shut-ins. Yet, there still is a chance that the first quarter will pass first quarter of 1935 in production. They are talking up 400,000 cars here for next month which would make 1,110,000 cars, roughly, for the first quarter. That would be just enough to do the trick—squeeze in ahead of early 1935.

The United States outdoors may feel like Little America these days, but the motor makers have a few trump cards left. For one thing, they say that each five-point rise in the stock market means just so many more automobile buyers by spring.

For another, funds from the soldiers' bonus. And for a third, the open weather in another six weeks. All should prove to be healthy factors for a bang-up spring market for cars.

Releases Thawing Out

A few signs are creeping to the surface that March is held in higher appraisal. The bolt and nut people have had a perking up in automotive releases for March. Some of the hardware makers, such as Ternstedt Mfg. Co., look a shade busier. Both are excellent barometers of assemblies a month hence.

Furthermore, the used-car problem is not getting any worse. While that is a negative way to look on the industry's chief nightmare, it is a source of some transient cheer.

Speaking of used cars, when an important official of a motor company admits "that the used car problem is almost entirely the makers' own fault" as one did to this department a week ago, that's like the man biting the dog.

What he meant was that the industry changes models too frequently, writes down a perfectly good model, mechanically, overnight for the sake of a few frill changes. He did not go into the merits—or lack of them—on the dealers' attitude toward used cars, but his remarks do cover the fact that too many 1934 and 1935 models are gathering snow in the used car lots today.

No automobile manufacturer seems to be doing much about it, though, for the tool and die shops here are getting ready for a big program for 1937. If you are in the automobile game and are not going to change your model for next year, you're simply out of the swim.

To Abandon Junk Payments?

In regard to the "wrecking programs" by which Chevrolet and Pontiac made the front pages, there are a few handicaps that many do not realize. In the first place, these $20 bounties can only retire the four-wheel down-and-outers. There is no offer for the used car in the $200-$400 bracket, and that is the one that is overcrowded.

To climb out on the limb and offer a prediction, this department can readily foresee where the best intent of Chevrolet on this score will only be transient. Primarily, its missionary work lacks the co-operation necessary from competitors.

Furthermore, the idea of $20 for a scalp is not one that makes for $25 Christmas bonuses by parent General Motors. In other words, it is a losing proposition. Ford once tried buying wrecks for $20 and before it got through it found it was losing $22 a car, additionally.

General Motors may be making a splurge in the American machine tool and other new equipment markets (not to forget new die work) but at Ford headquarters two important export developments are "breaking."

Ford is laying plans for an ambitious program for Japan, the present intent calling for expansion of the assembly plant in Yokohama. A number of machinery and other equipment changes have been on the boards at the Rouge, all for purchase here and export to the land of the rising sun.

Doubtless Ford thinks the best way to fight fire is with fire; it was not many months back that the Japs threatened California shores with a 4-wheel model that looked like a glorified Austin. Maybe the V-8 in greater numbers in the Orient will reverse matters.

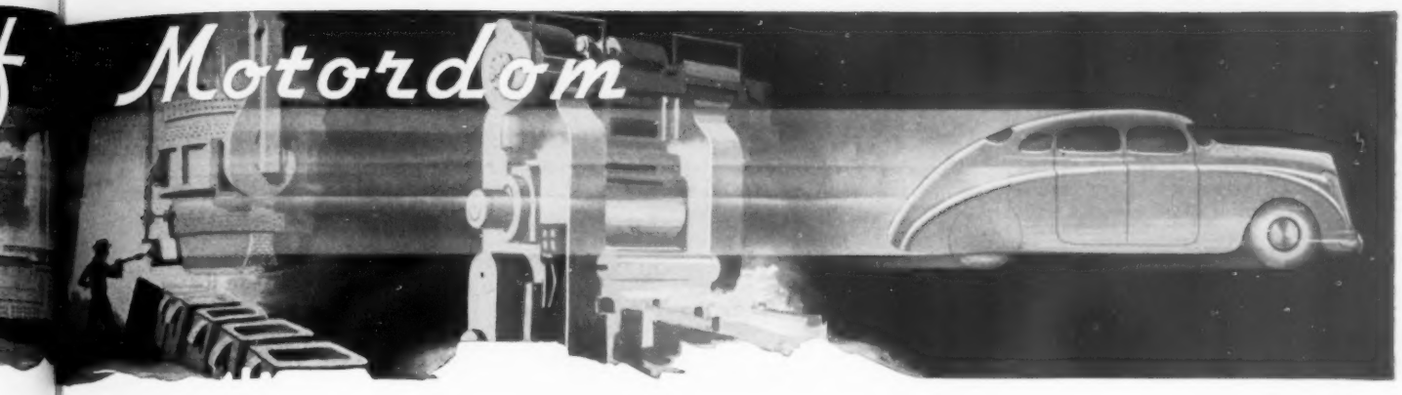
In Germany, Ford has run into difficulties with Herr Hitler, this of course affecting the large Ford assembly works at Cologne. The trouble has been that the Germans want Ford to do all his retooling for Cologne internally with German makers. With the ban on usual sources from the United States, one of Ford's chief mechanics at Rouge had to leave for Germany a week ago. He was closely followed by an assistant to see what could be worked out on the spot.

So, like the British Empire on which the sun never sets, the automobile industry constantly runs into its export problems, and especially when it maintains capital investments in the form of assembly plants spread out over the globe.

Builds 15,000 Weekly

Meanwhile, at the Rouge itself Ford's assemblies may, but are not likely to, touch the 70,000 mark in February. That goal was set for the month as January closed, but assemblies have been running closer to 15,000 a week than to 20,000 since Ford has been shutting down from Thursday afternoons until Monday mornings. There will not be more than 16 working days there this month. Last week Ford only worked from Monday to Wednesday.

Cautiously, Ford has been playing close to the shore with parts' stocks. On one certain important spring part supplied Ford—one to a car—releases have been dealt out the past week for a shipment of 20,000. In the late months of 1935 and even in January of 1936 it was customary for Ford purchasing officials to re-



lease in lots of about 45,000 parts.

The mid-western cold weather is acting as a double-edged sword, though, for Ford and all the rest. Even though zero cuts down buying interest in new cars, it also makes driveaways from the plant hazardous and in many cases impossible, which is some, but slight, consolation. The one reason why Chrysler was closed week before last was because it couldn't get driveaways on 18,000 cars stocked at the plant.

At the Lincoln division elation still reigns over the Zephyr, where they claim they have an unfilled order book listing 5000-odd names. About 1000 of the Zephyrs were registered over the country during January.

Ford's own dealers, some 7000 in all, have been taking kindly to the Zephyr and selling more of them than they had been reckoned on. Incidentally, they have not yet licked the front fender draw problem on the Zephyr, for the lamp is still made by cutting a hole out of the fender rather than drawing the entire fender in one piece.

Open Hearths Taking Form

Great Lakes Steel Corp., which Detroit holds up with pride as its major steel producer, will have its four new open-hearth steel furnaces in operation by September. Foundation work is under way, and like the eight open hearths now in operation there, the new units will be 150-ton, oil-fired. Last week bids were closed on 16,000 tons of structural steel for the new open-hearth building, slab yard and gas producers.

By fall, with 12 open hearths, Great Lakes will have an ingot capacity of about 1,200,000 tons, for with eight it now has a rated listing of 920,000 tons. Though 150-ton units, heats in many cases have been better than 190 tons in each of the existing eight.

The 79-inch continuous sheet mill Great Lakes is also building should be turning over for the first time in March. In order to continue to utilize the old Michigan Steel division a few miles away at Ecorse, hot-rolled breakdowns probably will be shipped there from the 79-inch mill.

Though at nearby Delray, Mich., on Zug Island, Great Lakes is running both blast furnaces, it also is accumulating a scrap inventory, obviously against the time when 12 basic open hearths will be operating.

It wasn't long after NRA's neck met the guillotine last May that the automobile industry said it would be the first to break open steel prices, and some concessions have been won, but by second quarter of 1936 there probably will be a corrective adopted.

This will be in a quantity differential plan for sheets and strip; like that for merchant bars and cold-drawn bars. It would name a flat price for a representative shipment of sheets or strip at one time, then openly give regulated and graduated concessions for larger orders and add extras to the base for smaller commitments.

Carrying out the motor industry's policy of duplicate plants for all products, Electric Auto-Lite Co., Toledo, O., will use a unit at Marysville, Mich., for making spark plugs. A unit at Fostoria, O., is also being renovated. . . . . Mullins Mfg. Co. sold its steel boat division recently to an Oil City, Pa., group, but will be out before long with a new line, an all-steel two-wheel freight trailer that from a design standpoint is an innovation. . . . . Hudson, convinced of a spring pickup, held sales conferences in 84 districts last week. . . . Orders for about $30,000 in precision gages were recently placed by Ford. . . . . Great Lakes Steel Corp. is now in a new office building, adjoining the smaller building built in 1930. A. C. Spark Plug also has a new office building. . . . . Death of Roy D. Chapin, president of Hudson and a "young pioneer" of the industry, was a shock to Detroit last week. . . . . Peco Mfg. Co., Philadelphia, has become a subsidiary of Bendix Mfg. Co. . . . . Car heater sales are now showing a seasonal decline, believe it or not, which affects McCord Radiator Co. and others. . . . . Delco Brake division of General Motors, newly formed, will take over hydraulic brake manufacturing from Delco Products division, Dayton, O. . . . . Graham, which claims it has spent $500,000 for new equipment, has been toying with the idea of placing a four-passenger coupe on the market. . . . Statistics show that automobiles used on rural free delivery postal routes travel approximately 406,588,800 miles a year, according to W. R. Tracy, vice president of Hudson. . . . Ford is introducing a new bus chassis especially equipped for bus operations on a 131½ and 157-inch wheelbase. . . . In 1935 visitors to the Rouge plant of Ford, largest industrial plant in the world, totaled 91,091, compared with 63,603 in 1934. It is expected that 1936 will better the record of 121,811 set in 1929.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1934	1935	1936
Jan.	155,666	292,785	*380,000
Feb.	230,256	335,667	
Mar.	338,434	429,793	
Apr.	352,975	477,691	
May	330,455	364,662	
June	306,477	361,248	
July	264,933	336,985	
Aug.	234,811	239,994	
Sept.	170,007	89,804	
Oct.	131,991	275,024	
Nov.	83,482	398,039	
Dec.	153,624	407,804	
Year	2,753,111	4,009,496	

*Estimated.

Estimated by *Cram's Reports*

Week ended:

Feb. 1	85,790
Feb. 8	69,876
Feb. 15	75,170
Feb. 22	62,813

Production

HOLDING at 54½ per cent, the upward trend in steel production was temporarily arrested last week. Increases of 3 points at Youngstown, 1 point at Buffalo, and 3 points at Birmingham were offset by declines at Pittsburgh, Chicago, New England and Cincinnati. Operations appear to have reached a stalemate in most leading steelmaking centers, and if Youngstown drops 3 points this week as its schedule indicates, a slight decrease may be expected. Further details follow:

Youngstown—Gained 3 points to 65 per cent, with a drop to 62 per cent indicated for this week. Republic Steel Corp. resumed melting last Sunday in a Haselton blast furnace which has been idle two months, while Youngstown Sheet & Tube Co. plans to suspend production at one of its Hubbard works blast furnaces.

Chicago—Declined ½-point to 59 per cent. Maintenance of incoming business points to steady ingot production during the coming several weeks. Output of blast furnaces is holding, with 19 of 41 stacks active.

Wheeling — Unchanged at 84 per cent last week, after four consecutive weekly gains. Thirty-one out of 37 open-hearth furnaces are active.

Detroit — Unchanged at 94 per cent last week, with 16 out of 17 open-hearth furnaces in production.

Pittsburgh—Down 1 point to 39 per cent last week. A leading mill closed last week at 38 per cent, although another leading producer's operations were down 2 points to 43 per cent.

Twenty-seven of 60 steelworks furnaces continue in blast. Carnegie-Illinois Steel Corp. has 11 of 32 on; Jones & Laughlin Steel Corp., 7 of 11; National Tube Co., 2 of 4, and American Steel & Wire Co., Pittsburgh Crucible Steel Co. and Pittsburgh Steel Co., 1 each. Bethlehem Steel Co. continues with 4 of 7 at Johnstown, Pa.

Cleveland-Lorain — Unchanged at 66½ per cent, Republic Steel Corp. continuing with 11 open hearths, Otis Steel Co., 4, and National Tube Co., Lorain, 11.

Cincinnati—Off 8 points to 72 per cent, due to two open hearths being taken off. Seventeen out of 24 open hearths are now in production.

Birmingham — Up 3 points last week to 66 per cent, with 15 open hearths melting. This present rate of activity is expected to continue for some time.

Central eastern seaboard — Held at 37 per cent last week. While no immediate revision is in sight, greater production is expected in March.

Buffalo—Advanced 1 point to 35 per cent, with no immediate change expected. The late opening of Great Lakes navigation will tend to retard Buffalo's usual late season gain in open-hearth production, and temporary lull in automotive buying also is an important factor in this same direction. Thirteen open hearths are in production.

New England—Down 8 points to 75 per cent, with indications this rate will continue this week.

Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Feb. 22	Change	Same week 1935	Same week 1934
Pittsburgh	39	— 1	37	28
Chicago	59	— ½	53	44
Eastern Pa.	37	None	31	29½
Youngstown	65	+ 3	58	54
Wheeling	84	None	85	69
Cleveland	66½	None	79	77
Buffalo	35	+ 1	45	47
Birmingham	66	+ 3	55½	52
New England	75	— 8	63	79
Detroit	94	None	100	79
Cincinnati	72	— 8	†	†
Average	54½	None	50	47

†Not reported.

Costs $11,500 To Provide Work for a Steel Employe

AMERICAN Iron and Steel institute calculates that approximately $11,500 is required to finance and maintain the job of an average employe of the steel industry. This represents the average cost of providing an employe with a place to work, tools to work with, and materials to work on.

This outlay breaks down into the following average investment per employe: $8990 in raw material and manufacturing properties and equipment; $1580 in raw, semifinished, and finished materials and supplies; $930 for financing payrolls, taxes, freight and interest charges, repairs and replacements.

This computation is based upon a total investment of $4,700,000,000 in the steel industry on which, incidentally, the return after all expenses in the past ten years has amounted to only 2.5 per cent.

Henry Ford figured recently that it cost him $9007.37 to provide a place and equipment for each of his employes.

Elect Hughes Treasurer

Directors of the American Iron and Steel institute Thursday elected H. L. Hughes, vice president of the United States Steel Corp., treasurer of the institute, succeeding W. J. Filbert, formerly chairman of the finance committee of the Steel corporation, who has retired.

To Give Exchange Foundry Papers

J. E. HURST, president of the Institute of British Foundrymen, has been chosen by that organization as the author of its annual exchange paper to the American Foundrymen's association, to be presented at the annual A.F.A. convention in Detroit, the week of May 4, and will cover "The Heat Treatment of Cast Iron by Hardening and Tempering."

Mr. Hurst is probably the foremost British expert on centrifugal casting and heat treatment of cast iron and is technical director, Bradley & Foster Ltd., Darlaston, and also of Sheepbridge-Stokes Centrifugal Castings Co. Ltd., Chesterfield, England. He has been active in the development of cast iron metallurgy and particularly with the centrifugal casting process

The American Foundrymen's association announces that Lester B. Knight Jr., vice president in charge of sales, National Engineering Co., Chicago, has been selected as author of the association's official exchange paper to be presented at the 1936 convention of the Association Technique de Fonderie, the foundry technical association of France, which will be held in Lille next June. Mr. Knight's paper will deal with the more recent developments in sand conditioning and handling.

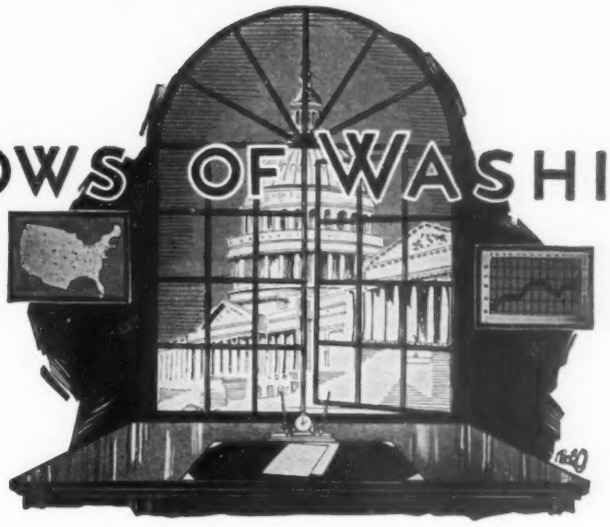
New Capacity

NORTHWESTERN BARBED WIRE CO., Sterling, Ill., recently placed orders for two 10-ton, top-charge, electric melting furnaces with the Pittsburgh Lectromelt Furnace Corp., Pittsburgh.

The furnaces, the first of which already is being installed at Sterling, will be used in conjunction with the Northwestern company's recent expansion program. The latter has included a new mill building and a continuous 22-stand rod mill, supplied by Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.

The two electric furnaces will use a 100 per cent scrap charge, and by the top-charge type design can be quickly operated, the product being a bar-size billet which is used direct on the rolling mill without any blooming mill operation. This type of furnace uses light scrap in the form of turnings, flashings, etc.

WINDOWS OF WASHINGTON



WASHINGTON

THE New Dealers win. And is the Supreme Court of the United States the best court in the land? The administration says so. The TVA decision came down last week, and the guessing percentage of the prognosticators fell 100 per cent.

Constitutional lawyers and other Washington guessers, including newspaper correspondents, had the firm conviction after the AAA decision of the court that there was no question but what it would find TVA unconstitutional.

What the court actually did was to uphold by an 8 to 1 decision, Justice McReynolds dissenting, the sale of power by the United States from the Wilson dam, and it approved by 5 to 4 the right of stockholders to sue in this case.

The validity of the act was ignored by the court, and while it did not find that the act was unconstitutional neither did it state that it is constitutional.

Guessers Confounded

There is the feeling in many substantial quarters in Washington that the decision demonstrates that the highest court in the land is only concerned with the fair interpretation of the constitution and is not interested in the promulgation of economic theories or social philosophy.

Having been cracked so hard a few weeks ago by the court, naturally administration leaders feel that life is worth living again.

All kinds of rumors were afloat just prior to the handing down of the decision, including such statements as that immediately after the decision Justice Brandeis intended to resign his seat on the court.

Also prior to the decision, there were many statements that the court was hopelessly in a tangle, and when the 8 to 1 vote came through it certainly caused consternation in the camps of those who are always looking for trouble—of which there are many.

Sharing the spotlight with the TVA decision was much renewed discussion on the final disposition of the Berry business advisory council. It is reported on the best authority that this council is anxious to continue as a permanent body and that every effort will be made to see if that end can be accomplished.

At this time the situation is as follows. All employes of Major Berry are on the NRA payroll. This activity goes out of existence on April 1, according to law. Also, Major Berry was appointed co-ordinator for industrial co-operation by the President by executive order based on powers that the President has under the NRA act. Because that act becomes nonexistent on April 1, therefore the executive order is automatically "out."

All of this means that unless either congress or the President acts either to reappoint Major Berry or make some appropriation, the council and the major just step out. However, Major Berry has been after the President to continue him, and Senator Pope, of Idaho, has a bill to continue the NRA research staff, for which he would appropriate $2,000,000.

Has Labor Backing

On the other hand, Secretary of Commerce Roper is just as insistent that the council be discontinued in view of the work of his own business council.

It must be borne in mind, of course, that Major Berry has the A. F. of L. influence behind him because its membership is represented on the council. If Major Berry wins it won't be the first time that he has had the better of Mr. Roper with the President in connection with his council.

It remains now simply to see who will be the winner, and that probably will not be known for another month.

Industry studies still being made by NRA personnel, including the steel study, are now slated for completion by March 15. At that time, Secretary Roper will decide just what will be done with these reports—whether they will ever be made public or whether they will just be sent to the President for his information and filing.

ELECTION NEAR, NEW DEALERS WEIGH WORDS CAREFULLY

As the days go round and round and the November elections draw nearer and nearer, new dealers are becoming more and more squirmish. They are apparently afraid of their shadows, and it is quite evident that administration spokesmen are becoming more careful of what they say.

This is notably evident at the press conferences, from the presidential biweekly conference right on down the line of government officials.

Pointing for the Campaign

At the White House conferences, the President does not speak nearly so frankly as he has up to this time, and he frequently laughs off a question that seems about to lead him into some kind of an embarrassing situation.

One of the things that is causing considerable comment among the newspaper fraternity here is the fact that the postmaster general is apparently doing nothing about giving up his cabinet job. It has put the President in rather an embarrassing situation because he has repeatedly stated publicly that he does not want government officials to be holding political positions at the same time.

There have been repeated rumors that Mr. Farley would resign to give all of his time to helping re-elect Mr. Roosevelt. The fact of the matter is

that he is doing that now—but the country is not very conscious of it. Those who believe in backstair gossip began more than a year ago to predict that Mr. Farley would be out of the cabinet by last spring, and they gave as an absolute deadline Jan. 1 of this year, and yet he is apparently no nearer giving up his generalship than he was a year ago.

It seems to be a foregone conclusion that if Mr. Roosevelt felt very strongly on this subject that Mr. Farley would have been out of the cabinet long ago, and yet, the President has made very definite statements about men holding a government and political job at the same time, apparently in deadly earnest.

NEUTRALITY EXTENSION MAY SEND CONGRESS HOME SOONER

Quite unexpectedly last week, in view of the opposition to extending the present neutrality law, both houses of congress rushed the extension bill through and placed it on the President's desk.

A couple of amendments were added, but otherwise the bill as it reached the President is practically identical with the present law, which expires Feb. 29. As the bill finally passed, it is effective until May 1, 1937.

The passing of this neutrality measure very much changes the situation in congress as to adjournment, as this was expected to be one of the bills which was to have held the legislature in session beyond what was desired by those—almost all—who have to mend their political fences.

There is every indication, unless something develops which is not now on the horizon, that congress will get away from Washington about May 1 or shortly thereafter.

Getting back to the neutrality bill as it finally passed, two important amendments were made to the present law: (1) no belligerent country may float bonds in this country or obtain loans with the single exception that the President may exempt ordinary commercial credits and short time obligations from the ban where this serves to "protect the commercial or other interests of the United States or its nationals," and (2) operations of the act shall not apply to Pan-American republics at war with non-American nations, unless the American republic is co-operating with a foreign nation in time of war.

It will be recalled, of course, that this law embargoes the sale, exportation, and transportation of arms, ammunition, or implements of war to any and all belligerent nations, excepting only American republics. It also prohibits American vessels from carrying arms, ammunition and implements of war to belligerents or for trans-shipment for use by warring nations.

LICENSE TIN SCRAP EXPORTS

President Roosevelt last Tuesday signed the bill prohibiting the exportation of scrap tin from the United States except under license.

The act provides that the license should be issued by the President, and he has designated that licensing power to the munitions control committee. This is the same committee which has charge of the neutrality regulations.

Provision was made in the act that it is to become effective 60 days after its signature. At that time, exporters must obtain licenses for export from the munitions control board before making any sales abroad.

Died:

J. B. CLOUGH, 66, for 20 years manager of the forge department of the Johnston & Jennings Co., Cleveland, Feb. 15. Born and educated at Marine City, Mich., he went to Cleveland about 40 years ago and was associated with several banks prior to entering the foundry business. He was a member of the Cleveland Engineering society and a prominent Mason.

♦ ♦ ♦

John Kennedy, 73, president, Hunter Saw & Machine Co., Pittsburgh, in Pittsburgh, Feb. 20.

♦ ♦ ♦

Fred Winsnes, 56, engineer, Youngstown Sheet & Tube Co., Youngstown, O., in that city, Feb. 14. Previously he had been connected with the American Bridge Co., and the Hunter Construction Co.

♦ ♦ ♦

Kenneth Lean, 69, former burgess of Munhall, and superintendent of transportation, labor and shipping at the Homestead steelworks of Carnegie-Illinois Steel Corp., Pittsburgh, at Munhall, Pa., Feb. 14. He had been associated with Carnegie-Illinois for 49 years.

♦ ♦ ♦

Edward F. Cole, 72, retired manufacturer of steamfitting and heating supplies, in Yonkers, N. Y., Feb. 16. Mr. Cole was graduated from Columbia university in 1886, and later became a partner in the Eton-Cole-Burnham Co., Bridgeport, Conn.

♦ ♦ ♦

F. A. Assmann, 83, pioneer maker of cans, in East Orange, N. J., Feb. 20. A year after the organization of the American Can Co. he became its president. Three years later he had a part in founding the Continental Can Co., heading the company's board from 1913 to 1922, when he retired. He came to the United States from Germany at the age of 19 and got a job in a New York city tin shop, subsequently becoming foreman and superintendent. He then formed a partnership with the owner, and when this company was absorbed when American Can Co. was organized, Mr. Assmann became a vice president and served on the board of directors and the executive committee.

♦ ♦ ♦

Edward M. Hamilton, 65, internationally-known metallurgist, in Sacramento, Calif., Feb. 12. Mr. Hamilton was a member of the A.I.M.M.E. and the developer of the process of precipitation of silver from cyanide solutions by the use of aluminum dust.

♦ ♦ ♦

Henry Newman Brinsmade, 78, retired mining engineer, in New York, Feb. 18. Mr. Brinsmade was born in Brooklyn, and was graduated from the Rensselaer Polytechnic institute. For many years he was engaged in developing iron ore mines on Lake Champlain for the Port Henry Iron Ore Co.

♦ ♦ ♦

Talbot G. Shipley, 62, general superintendent of American Car & Foundry Co., in St. Louis, last week. A native of Bowling Green, Ky., he entered the employ of American Car when 15 years old, and served continuously with the company. The steel department in St. Louis was erected in 1905 under Mr. Shipley's supervision.

♦ ♦ ♦

R. W. Cousins, 58, for the past 26 years chief electrical engineer at the Gary, Ind., plant of the Carnegie-Illinois Steel Corp., in Miami, Fla., Feb. 18. Mr. Cousins for a short time was employed by the General Electric Co., at New York, becoming associated with the Illinois Steel Co. in 1904 at the South Chicago works.

♦ ♦ ♦

Frederick Shearer, vice president of the European advisory board of the American Radiator Co., New York, since 1919, in Paris, Feb. 16. Mr. Shearer had been associated with the company since 1898, first as a clerk. Later he became a salesman in the New York territory and subsequently was transferred to London as assistant managing director of the British affiliate of the company. Later he was made managing director of the company in London.

♦ ♦ ♦

A. A. Hilton, 74, in Tacoma, Wash., Feb. 7. He had been associated with the steel business in the Tacoma territory, since coming from Chicago in 1909 to manage the Griffin Wheel Works, Tacoma. He also was president of the Hofius Steel & Equipment Co., Seattle, and later was engaged

in the steel brokerage business, representing Chicago Bridge & Iron Works and other eastern interests.

♦ ♦ ♦

David J. Nevill, 74, metallurgical engineer, Stearns-Roger Co., in Denver, Feb. 7. He was a member of the American Institute of Mechanical Engineers.

♦ ♦ ♦

John Elmer Garrity, 41, former general manager of sales, West Leechburg Steel Co., Leechburg, Pa., in Beverly Hills, Calif., Feb. 15. Mr. Garrity began his career as a stenographer for the West Leechburg company, progressing through various positions until about 1915, when he was named general manager of sales. He retired from that position about five years ago because of ill health.

♦ ♦ ♦

Bradford Brinton, 55, a director of the J. I. Case Threshing Machine Co., Racine, Wis., in Miami Beach, Fla., Feb. 15. A native of Tuscola, Ill., Mr. Brinton was graduated from Sheffield School of Yale University in 1904. He was vice president and secretary of the Grand Detour Plow Co., Dixon, Ill., until that company was taken over by the J. I. Case company in 1919. He retired about ten years ago.

♦ ♦ ♦

Frederic E. Wells, 92, pioneer manufacturer of taps and dies, in Greenfield, Mass., Feb. 13. In 1866 Mr. Wells formed a partnership with his father to manufacture cutlery in Shelburne Falls, Mass., and in 1873 went to Greenfield to become associated with the tap and die industry. Later, with his brother, F. O. Wells, he organized Wells Bros. Co., which he operated until 1916, when he retired.

♦ ♦ ♦

Fred E. Shearer, 62, member of the executive committee of the European branch of the American Radiator & Standard Sanitary Corp., in Paris, Feb. 15. He was educated in California and in 1895 entered the employ of the American Radiator Co. He had been connected with the European branch since 1904, spending 17 years in England and the last 15 years in Paris.

♦ ♦ ♦

Roy D. Chapin, 56, president, Hudson Motor Car Co., Detroit, in Detroit, Feb. 16. For many years identified with leaders in the automobile industry, he became president of the Hudson company in 1910, being chairman from 1923 to 1933, when he again resumed the presidency. In August, 1932, he became secretary of commerce, succeeding Robert P. Lamont, formerly of the American Steel Foundries, and subsequently with the American Iron and Steel institute. Mr. Chapin served in President Hoover's cabinet until March, 1933.

Men of Industry

H VAN ZANDT, formerly manager of sales in charge of structural shapes and plates in the Chicago district for Carnegie-Illinois Steel Corp., has been appointed manager of the newly-organized order division. This is a new unit formed by the consolidation of the former order department and sales detail functions.

Mr. Van Zandt's service with the United States Steel Corp. subsidiaries began in the plate department of the Homestead steelworks of

H. Van Zandt

Carnegie Steel Co. in February, 1907, being transferred a few months later to the sales department in the Carnegie building, Pittsburgh. In February, 1910, he was transferred to the Chicago sales office of Illinois Steel Co., remaining there until 1919, when he was transferred to the general office of Illinois Steel Co., Chicago.

In April, 1928, he was appointed assistant general manager of sales in charge of the structural division and in September, 1935, was named manager of sales for structurals and plates for the Chicago division of Carnegie-Illinois Steel Corp. Mr. Van Zandt will be assisted by Walter A. Levine as manager of the production bureau and James M. Morehouse as manager of the service bureau.

Walter A. Levine, assistant manager of the order department at Chicago for Carnegie-Illinois Steel Corp., has been appointed manager of the production bureau for that district. His service with Illinois Steel Co. began in January, 1898. He was promoted to chief clerk in the billet division of the Illinois Steel Co.'s order department in 1906, assistant chief clerk of the order department in 1917 and assistant manager of the order department from March, 1923.

James M. Morehouse, chief clerk of the bar division of Carnegie-Illinois Steel Corp. in the Chicago district, has been named manager of the service bureau. He has been with the company since October, 1909, barring intermission in World war service, and has been identified with the alloy division of the company since June, 1919.

Frank H. Lucas, structural engineer of the Illinois Steel Co. since February, 1930, has been appointed manager of sales of structurals and plates in the Chicago district, succeeding Mr. Van Zandt. He became identified with American Bridge Co. at Ambridge, Pa., in 1914, served as a captain in the 79th division during the World war and re-entered the American Bridge Co. employ as inspector in 1919. In 1920 he was transferred to the sales department of the company, made assistant contracting engineer in August, 1927, and was transferred to the Illinois

Raymond K. Bowden

Steel Co. as structural engineer in 1930.

♦ ♦ ♦

Raymond K. Bowden has been made manager of the metallurgical department, Chicago district, for the Carnegie-Illinois Steel Corp. He was graduated from Ohio State university in 1920 with the degree of bachelor of engineering and mining, serving

subsequently for two years as instructor of metallurgy at Carnegie Institute of Technology, Pittsburgh. Previous to graduation he was associated with the Central Steel Co., Massillon, O., where for two years he was employed as assistant chief inspector. Prior to his instructorship at Carnegie institute he spent one year in the heat treating department of the Crucible Steel Co., Park works, Pittsburgh.

After serving two years at Carnegie institute he returned to the Central Steel Co., where he was engaged in the metallurgical department of that company and its successors, the Central Alloy Steel Corp. and the Republic Steel Corp. In 1930 he joined the Illinois Steel Co. at its South works, Chicago, as superintendent of alloy production, and shortly thereafter was placed in charge of the general production department. Five years later he was advanced to the post of assistant to the general superintendent and placed in charge of product control.

Charles L. McGranahan

Who has been engaged by Jones & Laughlin Steel Corp. to supervise construction of its new strip-sheet mill and to operate it when completed, as noted in STEEL for Feb. 10

♦ ♦ ♦

C. L. Huff, formerly sales manager in charge of western sales of Bliss & Laughlin Inc., Harvey, Ill., has been elected vice president in charge of sales. Mr. Huff has had a wide and varied steel experience, beginning in 1907 when he was associated with the Illinois Steel Co. Chicago, in the department of metallurgy and inspection. During the World war he served in the United States navy as inspector of tests in the bureau of steam engineers, and at the close of the war became assistant purchasing agent of the Steel & Tubes Co. of America.

Mr. Huff became affiliated with the department of sales of Bliss & Laughlin in 1923, and in 1929 was advanced to the position of sales manager in charge of western sales.

George A. Spaulding, sales manager in charge of eastern sales of Bliss & Laughlin, has been elected vice president in charge of eastern activities, with headquarters at Buffalo. Prior to his association with this company he was connected with the Moline Plow Co. as purchasing agent, and later with the Tri-City Malleable Iron Co. as sales manager.

Mr. Spaulding began in the sales department of Bliss & Laughlin as a salesman in charge of the Iowa-Nebraska territory. In 1929 he was transferred to the Cleveland office as district manager of sales, and in 1933 was placed in charge of eastern sales, with offices at Buffalo.

Clyde E. Williams

New chairman of the Iron and Steel division of the American Institute of Mining and Metallurgical Engineers which met in New York last week (see p. 55). He is a director of Battelle Memorial institute, Columbus, O., and since 1929 has been in charge of technical work on iron and steel at the Institute

♦ ♦ ♦

G. A. Fritschi, formerly purchasing agent for the Vanadium Corp. of America, Bridgeville, Pa., and the Southern Mineral Products Corp., has been named Pittsburgh district sales manager for the Vanadium corporation, succeeding J. Alfred Miller.

R. Bonker has been appointed purchasing agent for the Vanadium corporation, with headquarters in New York.

♦ ♦ ♦

Paul B. Allen, vice president, Otis Steel Co., Cleveland, has resigned effective immediately. Mr. Allen plans to take a brief period for rest and recreation before again entering business.

Prior to going to Cleveland, Mr. Allen served as district sales manager at Detroit for Otis for 12 years. In April, 1935, he was named general manager of sales at Cleveland, succeeding J. G. Carruthers, and in June, 1935, was made vice president in charge of sales.

♦ ♦ ♦

Charles J. Gaskell has been appointed representative in Memphis, Tenn., for the Modine Mfg. Co., Racine, Wis., manufacturer of unit heaters, copper radiation, unit coolers and heat transfer equipment. He will cover the western part of Tennessee, northern part of Mississippi, and eastern part of Arkansas. His office is located in the Falls building, Memphis.

A graduate of the University of Wisconsin, he spent 7 years as plant engineer with the Bemis Cotton Mill, Bemis, Tenn.; 5 years as superintendent of construction with the Johns-Manville Co., in St. Louis, and 12 years as a sales engineer in Memphis.

J. C. Murray

Who as reported in STEEL for Feb. 10 has been made assistant general superintendent of the Pittsburgh works of the Jones & Laughlin Steel Corp.

♦ ♦ ♦

Charles Fleisch has been appointed assistant superintendent of the Carrie furnaces at Rankin, Pa., of Carnegie-Illinois Steel Corp. He succeeds Edward T. Warren, who, as noted in STEEL, Feb. 17, has become superintendent of blast furnaces at the Edgar Thomson works, Braddock, Pa.

♦ ♦ ♦

Clarence W. Howat has resigned as first vice president of the Pitts-

burgh Steel Foundry Corp., Glassport, Pa. Mr. Howat, who is not yet ready to announce future plans, became affiliated with this company in an executive sales capacity in 1923, and in 1925 became first vice president. He has been identified with the steel castings industry for about 25 years, serving in both production and sales capacities.

♦ ♦ ♦

C. E. Stryker has resigned as vice president and chief engineer of the Fansteel Products Co., North Chicago, Ill., to become associated with McKinsey-Wellington & Co., Chicago, management engineers.

♦ ♦ ♦

John Brunner, consulting metallurgist, Chicago district, Carnegie-Illinois Steel Corp., has been awarded the John Ericsson gold medal, in recognition of his research in connection with steel normalizing processes. He was awarded this medal by the American Society for Swedish Engineers, New York, at the annual dinner of the society Feb. 11.

♦ ♦ ♦

John Russell Fox has been appointed contracting manager of the bridge and structural department of the American Bridge Co., in charge of all contracting and erecting activities on the Pacific coast, succeeding the late Edward J. Schneider. Mr. Fox became connected with the

Frank L. Gibbons

Made manager of sales of the newly-created alloy division of Carnegie-Illinois Steel Corp., with headquarters in Chicago, as reported in STEEL for Feb. 3. He formerly was vice president of the Timken Steel & Tube Co.

American company in 1910, in the shops and drafting rooms at Gary, Ind. Later his work in the erecting department took him into the Duluth, St. Louis, and Chicago territories. In 1921 he was transferred to the San Francisco office of the United States Steel Products Co. as a contracting engineer. He is a member of the American Society of Civil Engineers and the Engineers' club.

♦ ♦ ♦

H. Fleishour, formerly connected with the W. A. Jones Foundry & Machine Co., Chicago, has been made general foundry foreman, Davenport Machine & Foundry Co., Davenport, Iowa.

♦ ♦ ♦

Harold L. Holtz, controller of the Sivyer Steel Casting Co., Milwaukee, has been elected a vice president of the company.

William F. Stremke, formerly assistant to the president, has been elected assistant secretary.

♦ ♦ ♦

Carlton Mauthe, formerly vice president, of the Sanitary Refrigerator Co. and the Sanitary Electric Corp., both at Fond du Lac, Wis., has been elected president of both companies to succeed his father, William Mauthe, who becomes chairman of the board and continues as treasurer. Herman Uihlein, president of the Lavine Gear Co., and other industries in Milwaukee, is a member of both directorates.

♦ ♦ ♦

C. W. Heppenstall, president, Heppenstall Co., Pittsburgh, was honored at a dinner in the William Penn hotel, Pittsburgh, Feb. 15, celebrat-

Hold Important Posts in New Division of Research and Development of Crane Co., Chicago

C. A. OLSON

Made research engineer of industrial and heating products. Graduate of Lewis institute, he entered employ of Crane Co. in 1906 and soon became manager of the company's first experimental laboratory. When the company started to manufacture plumbing fixtures, he was placed in charge of engineering for that department, and later was put in charge of development of new lines of boilers, radiators, air conditioning equipment, shallow and deep well pumps

R. H. ZINKIL

Made research engineer of plumbing products. He was graduated from Crane Technical High school and the Lewis institute, Chicago. In 1905 he started in the engineering department of Crane Co., making blueprints. He advanced to tracing and up the line until 1917, when he became chief draftsman. In 1923 he was appointed manager of the testing division and in 1925 was made manager of the newly-formed plumbing engineering department

J. P. MAGOS

Named testing engineer of the research testing laboratories. He received his engineering, education at Armour Institute of Technology, and went to the University of Chicago for advanced study in mathematics, physics and chemistry. While there he engaged in research work in the Ryerson physical laboratory. He has been employed by Crane Co. since 1922, doing product design work and general testing in the product engineering department

ing the forty-third anniversary of his association with the company. About 100 Heppenstall executives, sales representatives and other employes attended.

♦ ♦ ♦

Raleigh D. Mills has resigned as vice president and director of the City Auto Stamping Co., Toledo.

C. C. Bigelow, treasurer, and G. E. Whitlock, general manager, have both been named vice presidents of the City company.

♦ ♦ ♦

A. M. MacCutcheon, engineering vice president, Reliance Electric & Engineering Co., Cleveland, has been nominated for president of the American Institute of Electrical Engineers, New York, for the term beginning Aug. 1, 1936.

Mr. MacCutcheon was graduated

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A. M. MacCutcheon

from Columbia university in 1908 with a degree in electrical engineering. From 1909 to 1914 he was associated with the Crocker-Wheeler Co., in charge of engineering estimates. In 1914 he left this post to take charge of all new design work for the Reliance company, and in 1917 was appointed chief engineer. In the fall of 1917 he entered the United States navy, and after his release in 1919 he returned to his former position. In 1920 he was elected a director of the company, and in 1923 was appointed to his present position.

In 1917 Mr. MacCutcheon became a member of the Association of Iron and Steel Electrical Engineers. He has served on various committees for this body and has delivered 20 papers before this association. Since 1921 he has been a member of the Cleveland Engineering society. He served as a director for this organization from 1923 to 1925, and has served on many committees.

Light Steel Gains Most in Upturn

STEEL production, pursuing its upward trend in 1935, continued to reflect the increasing predominance of light steel forms over the heavier products giving greatest support. In the annual analysis of steel production, compiled by the American Iron and Steel institute, total production for sale of iron and steel products in 1935 was 27,379,755 gross tons, compared with 21,174,628 gross tons in 1934, a gain of 29.3 per cent.

Light steel products, including sheets, strip, wire, tin and black plate, aggregated 11,765,433 gross tons in 1935, compared with 8,575,004 tons in 1935, an increase of 37.2 per cent.

Sheet capacity was engaged 70.4 per cent in 1935, compared with 47 per cent in 1934; tin plate capacity was engaged 65.6 per cent in 1935 and 56.7 per cent in 1934; hot-rolled strip capacity engaged 54.8 per cent in 1935 and 38.3 per cent in 1934.

Steel Production for Sale in 1935

		Gross Tons				Shipments
			Production for Sale			To members of the industry for conversion into further finished products
Steel Products	Number of companies	Annual capacity	Total	Per cent of capacity	Export	
Ingots, blooms, billets, slabs, sheet bars, etc.	43	.....	4,410,447	.....	43,643	3,876,843
Heavy structural shapes	14	5,440,820	1,329,959	24.4	37,919	.....
Steel piling	6	270,000	121,770	45.1	5,186	.....
Plates—Sheared and Univ.	27	6,393,635	1,421,797	22.2	44,498	14,144
Skelp	11	.....	437,621	.....	61,347	268,407
Rails—Stand. (over 60 lbs.)	8	4,170,000	621,245	14.9	19,577	.....
Light (60 lbs. and under)	8	775,820	51,412	6.6	8,238	.....
All other (incl. girder, guard, etc.)	3	140,000	29,663	21.2	3,296	.....
Splice bar and tie plates	19	1,622,393	235,373	14.5	3,686	.....
Bars—Merchant	46	.....	2,650,574	.....	42,989	267,602
Concrete reinforcing	33	.....	500,767	.....	8,412	.....
Cold finished—Carbon	18	.....	504,143	.....	4,564	.....
Alloy—Hot rolled	18	.....	535,253	.....	3,083	35,711
Cold finished	12	.....	50,657	.....	204	.....
Hoops and baling bands	8	.....	48,169	.....	1,378	.....
Total Bars	68	13,114,245	4,289,563	32.7	60,630	303,313
Tube rounds	8	.....	63,224	.....	.....	57,825
Tool steel bars (rolled and forged)	18	110,320	31,302	28.4	104	.....
Pipe and tube—Buttweld	16	1,829,928	522,834	28.6	24,694	.....
Lapweld	11	1,804,534	334,417	18.5	12,043	.....
Electric weld	3	813,571	75,984	9.3	341	.....
Seamless	15	2,519,978	770,584	30.6	24,694	.....
Conduit	6	142,350	39,077	27.5	.....	.....
Mechanical tubing	5	212,050	74,775	35.3	5,175	.....
Wire rods	20	.....	555,451	.....	24,354	263,092
Wire—Drawn	40	1,732,532	931,334	53.8	43,891	17,556
Nails and staples	22	1,156,642	427,087	36.9	14,507	.....
Barb., fence, bale ties, etc.	26	1,588,364	457,402	28.8	34,662	.....
Black plate	15	428,879	312,601	72.9	8,876	106,496
Tin plate	16	2,526,256	1,657,954	65.6	169,203	.....
Sheets—Hot rolled	25	.....	1,162,287	.....	18,121	118,355
Hot rolled annealed	26	.....	1,458,306	.....	40,287	1,703
Galvanized	19	.....	902,073	.....	79,552	.....
Cold rolled	23	.....	1,601,501	.....	38,760	.....
All other	16	.....	413,700	.....	7,048	.....
Total sheets	37	7,871,255	5,537,867	70.4	183,768	120,058
Strip—Hot rolled	35	3,476,456	1,904,835	54.8	31,507	242,166
Cold rolled	39	1,101,592	536,353	48.7	10,484	.....
Wheels (car, rolled steel)	6	398,284	83,039	20.8	8,310	.....
Axles	9	429,900	25,969	6.0	5,600	.....
Track spikes	12	345,760	76,758	22.2	981	.....
All other	7	21,207	12,058	56.9	3,934	.....
Total steel products	168	.....	27,379,755	.....	895,148	5,269,900
Estimated total steel finishing capacity based on yield from ingots of 67.3%	....	45,617,500	.....	48.5	.....	.....
Iron Products						
Pig iron, ferromanganese and spiegel	35	.....	3,775,898	.....	6,040	1,169,230
Ingot molds	6	.....	276,185	.....	5,566	.....
*Plates	....	.....	.....	.....	.....	.....
*Skelp	....	.....	.....	.....	.....	.....
Bars	14	249,019	44,341	17.8	26	1,256
*Splice bars and tie plates	....	.....	.....	.....	.....	.....
Pipe and tubes	4	213,153	34,885	16.4	342	.....
*Sheets	....	.....	.....	.....	.....	.....
All other	7	153,460	27,550	18.0	1,141	2,134
Total iron products	19	557,672	106,779	19.1	1,509	3,390

*Included in "All other."

Editorial

Congress Needs Industry's Help on Anti-trust Laws

MORE than half a century has passed since 1882 when the word "trust" was first used to designate a combination whose objective was monopoly of trade. Something less than 50 years has transpired since the word with a capital "T" first appeared in the platforms of the major political parties. It is exactly 47 years since the state of Kansas passed the first anti-trust law enacted in any state and 46 years since John Sherman of Ohio introduced the first anti-trust bill into the congress of the United States.

One might think that in the ensuing years since the problem of monopoly first attracted the attention of statesmen, industry and the public, marked progress toward its solution should have been achieved. Certainly there has been no lack of initiative or effort in the scores of attempts to find a practical means of controlling competition. A sufficient number of laws has been written, the record of court decisions is ample, the authority of supervisory commissions has been adequate and the force of public opinion has been powerful. Yet with all of this experience, we seem to have failed to evolve even a rudimentary basis for the solution of the problem.

Scores of Conscientious Congressmen Are Seeking Practical Curb for Monopoly

This unfortunate conclusion is patent to anyone who takes the trouble to plumb the sentiment of congressional leaders in Washington today. One finds public servants who approcah the intricate questions of monopoly and competition from widely divergent points of view. On one extreme are those who are fanatically opposed to anything which by the wildest stretch of imagination can be connoted by business or industry. These usually are the vociferous demagogues—the cheap politicians who condemn industry for the advantage it seems to give them at the ballot box. At the other extreme are the standpatters—the reactionaries who refuse to believe that monopoly and competition are live issues. Their votes are valuable as a check against radicalism and visionary experiment, but the weight of their influence for progressive, constructive action is negligible.

Between these extremes are scores of conscientious, sincere senators and representatives who in their quiet way recognize the fact that the problem of regulating competition is serious and that it still is far from solution. These congressmen realize the danger of passing laws which, while ostensibly protecting the small business from the power of large corporations, in actual effect may hurt all business. They—above all others in the political arena—are frank enough to admit that they need the enlightened assistance of industry itself in finding a practical solution to this difficult problem.

We believe progressive industrial leaders should respond to this implied call for help. It is true that the anti-business tactics of persons in high places in government have cooled the ardor of many in industry who otherwise would have been willing and eager to co-operate with federal officials. Nevertheless, the need of sanity in the relations between government and industry on matters of competition is so urgent that co-operative action cannot be refused on the grounds of incompatibility involving a small fanatical block.

Most of Current Proposals for Amending Anti-trust Laws Will Penalize Efficiency

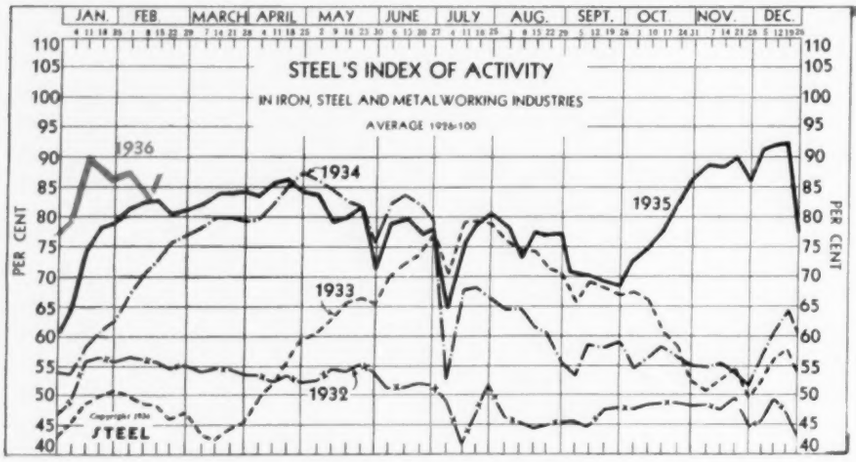
Point is given to this urgency by the several actions now pending to amend the anti-trust laws. Some of these proposals are alarming. In their desire to curb the power of "big business," the sponsors of some of these amendments would enact laws which would punish efficiency on one hand and protect inefficiency on the other. The more radical legislation would curb all legitimate business in the attempt to destroy the power of monopoly allegedly exercised by a few large corporations.

The proponents of such legislation pretend to conceal an ace up their sleeves. It is a part of their strategy to hold an implied threat over their opponents. They say that their legislation must be enacted, otherwise the only alternative is the licensing of all business by the federal government.

Of course this threat is premature. The ill-conceived bills thus far introduced are not the alternatives of licensing or of complete federal domination of business. Nevertheless the mood of congress today is such that the public and industry cannot afford to take chances.

Industrial leaders should work sympathetically with the conscientious members of congress to the end that the next chapter in the control of competition shall be written sensibly, rather than fanatically.

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries gained 2.4 points to 86.2 in the week ending Feb. 15:*

Week ending	1935	1934	1933	1932
Dec. 21	91.9	64.4	58.0	46.9
Dec. 28	77.3	60.8	53.7	42.9
	1936	1935	1934	1933
Jan. 4	78.2	65.4	53.6	45.3
Jan. 11	90.2	73.8	58.1	48.6
Jan. 18	89.3	78.1	60.9	49.8
Jan. 25	86.0	79.5	62.3	50.8
Feb. 1	86.5	81.8	66.9	49.9
Feb. 8	83.8†	82.7	70.7	48.7
Feb. 15	86.2*	82.8	72.4	48.3

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL). *Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.*

Average Activity for First Quarter Will Be High

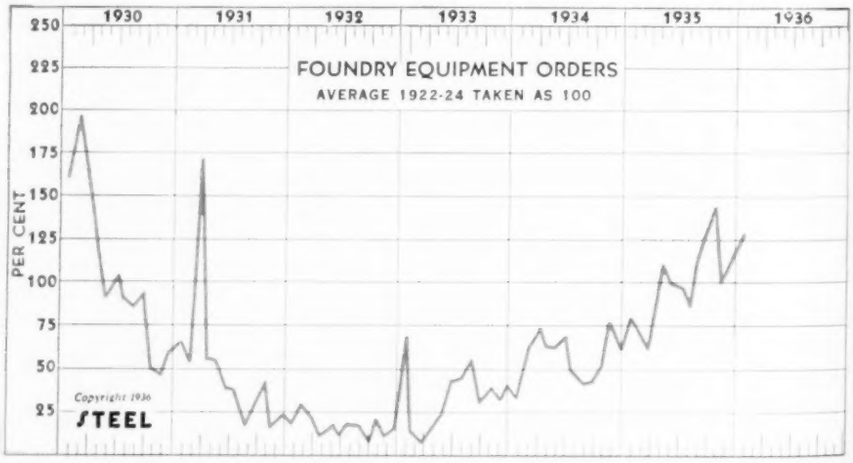
IN SPITE of the uncertain ups and downs in the trend of industrial activity during the first seven weeks of 1936, there is a strong likelihood that the showing for the entire first quarter, when it is revealed, will compare favorably with any quarter-year of the recovery period to date.

The best calendar quarters since the low point of 1932 were April, May and June of 1934 and October, November and December of 1935. The average of STEEL'S index of industrial activity for the former quarter was 82.4; the average for the latter was 84.4. Thus the fourth quarter of 1935 not only was better than the second quarter of 1934 by a slight margin, but it was the best quarter in the recovery since 1932.

Therefore in appraising the current three-month period, a comparison with the fourth quarter of 1935 seems logical. The average of STEEL'S index for the first seven weeks of the present quarter is 85.7. This compares with 81.9 for the first ,seven weeks of the fourth quarter of 1935 and with 84.4 for the entire quarter. From this it is apparent that activity to date in the current quarter is running nicely ahead of that of the best comparative period. Even with an average of only 82.4 for the remaining weeks until March 31, activity will at least equal the best postdepression record.

This goes to show that in spite of the disconcerting uncertainty of the current trend, business is moving at encouraging levels. Translate this volume of activity into terms of industrial

	Per Cent			
	1936	1935	1934	1933
Jan.	127.0	86.6	37.2	68.4
Feb.	.....	75.7	65.8	16.1
March	.....	69.3	75.4	9.8
April	.....	113.2	67.9	19.4
May	.....	100.7	66.5	25.6
June	.....	100.2	70.4	45.5
July	.....	94.0	50.7	48.8
Aug.	.....	113.0	43.1	56.3
Sept.	.....	128.5	46.4	34.9
Oct.	.....	140.0	55.3	42.5
Nov.	.....	100.4	80.4	36.6
Dec.	.....	118.1	66.9	43.8



profits for January, February and March of 1936 and you arrive inevitably at the conclusion that the business outlook is bright.

The data necessary for translating activity into profits are available in the financial reports of industrial corporations for 1935. The quarter-by-quarter returns show that with a volume such as that of the fourth quarter, profits increase proportionately more than gross income or production. In other words, volume is at that level where many companies can turn out more business without adding proportionately to the number of their employes and without incurring proportionate increases in other forms of expense. Moreover, there has been an appreciable improvement in operating efficiency since the abandonment of NRA.

Getting down to the week-to-week movement in activity, we find a fairly strong demand for steel which has lifted steelworks operations to the highest point touched this year. Electric power output continues at high levels. Revenue freight traffic increased moderately in the last week of record. Automobile production, which had been slumping steadily, reversed itself slightly in the week ending Feb. 15 with a gain of 5294 units.

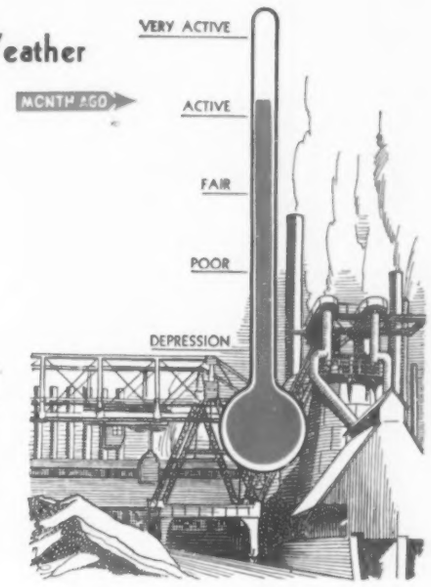
An outstanding feature of February is that improvement in the capital goods industries has gone a long way toward offsetting the lack of strong support from the important motor car industry.

Where Business Stands

Monthly Averages, 1935=100

	Jan., 1936	Dec., 1935	Jan., 1935
Steel Ingot Output	105.1	114.7	97.6
Pig Iron Output	113.4	118.3	82.7
Freight Movement	97.1	95.6	89.5
Building Construction	129.1	159.5	53.6
Automobile Output	111.9	120.9	95.6
Wholesale Prices	103.7	104.1	94.9

Industrial Weather



TREND:
Steady

The Barometer of Business

Industrial Indicators

	Jan., 1936	Dec., 1935	Jan., 1935
Pig iron output (daily average, tons)	65,445	68,275	47,692
Machine Tool Index	102.6	99.9	61.3
Finished Steel Shipments	721,414	661,515	534,055
Ingot output (daily average, tons)	112,942	123,272	104,969
Dodge building awards in 37 states (sq. ft.)	27,053,300	33,441,900	11,245,100
Automobile output	*390,000	421,579	303,372
Coal output, tons		34,829,000	36,393,000
Business failures; number	1,077	940	1,184
Business failures; liabilities	$18,104,000	$17,442,649	$18,823,697
Cement production, bbls.		5,803,000	3,202,000
Cotton consumption, bales		498,000	546,787
Coal loadings (weekly av.)	588,278	579,646	542,618

*Estimate.

Financial Indicators

25 Industrial stocks	$196.26	$191.96	$143.88
25 Rail stocks	$34.22	$31.98	$27.78
40 Bonds	$85.76	$83.52	$82.98
Bank clearings (000 omitted)		$26,392,778	$21,268,788
Commercial paper rate (New York, per cent)	¾	¾	1
*Commercial loans (000 omitted)	$7,999,000	$8,249,000	$7,591,000
Federal Reserve Ratio, per cent	78.2	77.6	71.8
Railroad earnings	†$46,040,165	$54,234,305	$38,729,833
Stock sales, New York stock exchange	67,211,035	45,590,420	19,409,752
Bond sales, par value	$472,543,300	$315,500,000	$332,540,800

*Leading member banks Federal Reserve System.
†December, November and December, respectively.

Foreign Trade

	Jan., 1936	Dec., 1935	Jan., 1935
Exports		$223,737,000	$176,223,000
Imports		$186,648,000	$167,006,000
Gold exports		$170,000	$363,000
Gold imports		$190,180,000	$149,755,000

Commodity Prices

	Jan., 1936	Dec., 1935	Jan., 1935
STEEL's composite average of 25 iron and steel prices	$33.31	$33.31	$32.58
Bradstreet's index	$10.36	$10.40	$9.49
Wheat, cash (bushel)	$1.19	$1.15	$1.13
Corn, cash (bushel)	83c	79c	$1.04
Petroleum, crude (bbl.)	$1.08	98c	98c

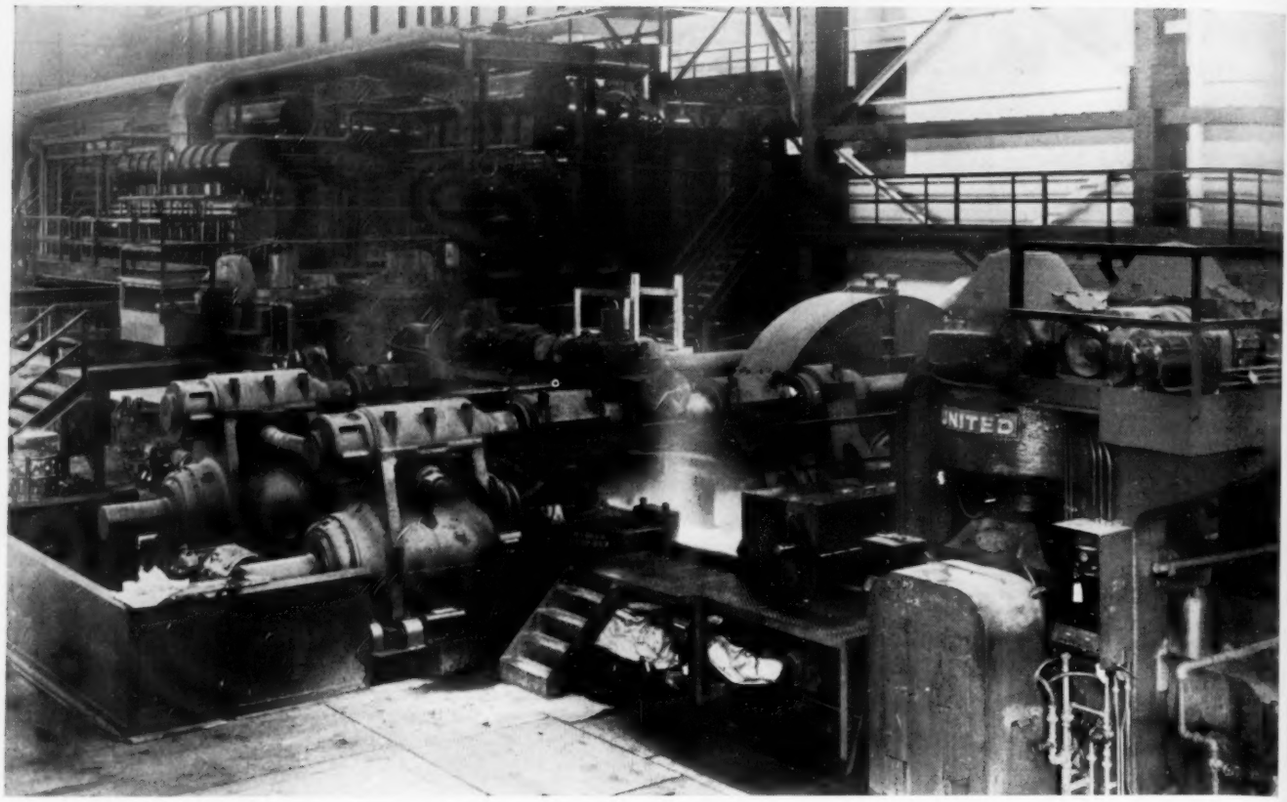
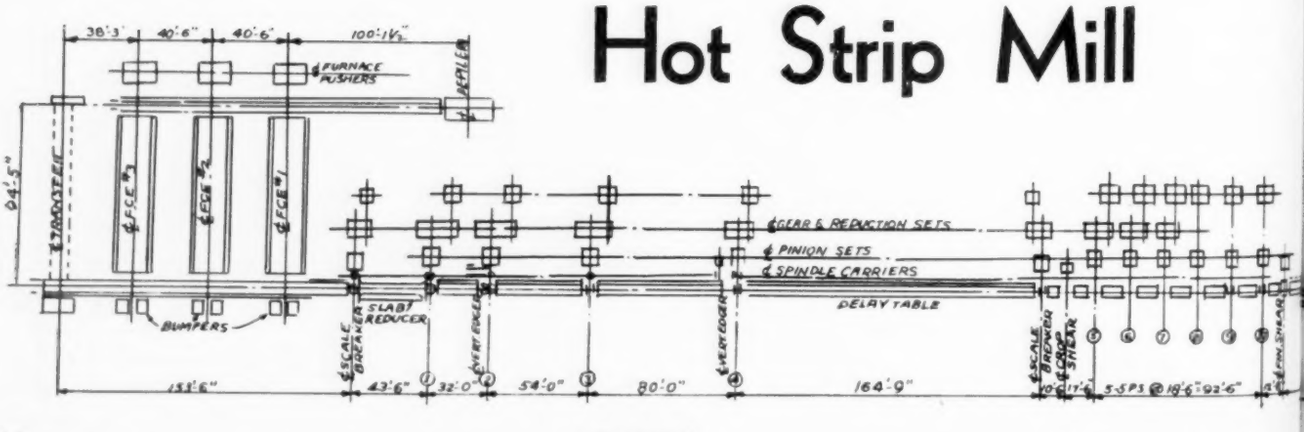


Fig. 1—The slab reducer is capable of reducing the width of 6¼-inch slabs by 3 inches at a single stroke. Minimum slab width is 12 inches

Co-ordinated Design and Operation Feature McDonald Hot Strip Mill



MAXIMUM efficiency in producing high-quality, close-tolerance strip and sheet in widths up to 37 inches was the objective when Carnegie-Illinois Steel Corp. decided to install its new 4-high 43-inch continuous hot strip mill at its McDonald, O., plant. That this has been achieved will be admitted by anyone who sees the new mill in operation. Laid out with plenty of room, co-ordinated from the time the slabs enter the slab yard until the finished product leaves the plant, this new mill is a monument to modern engineering.

Design and layout was co-ordinated in the Carnegie-Illinois offices, the United Engineering & Foundry Co., Pittsburgh, being responsible for design and installation of the continuous hot mill and various other companies for special pieces of equipment such as furnaces, lubricating systems, conveying and transferring, etc. The plant is designed to turn out a maximum of 30,000 tons of strip and sheet steel per month from 18-gage to $\frac{3}{8}$-inch thickness. This design contemplates coils up to $\frac{1}{4}$-inch thick, ranging from 180 to 300 pounds per inch of width, or in cut sheets from 30 inches to 30 feet in length and up to $\frac{3}{8}$-inch thick. Minimum rolling width will be 12 inches, coil and sheet slitters make all widths from 4½ inches up to the full 37-inch maximum width available.

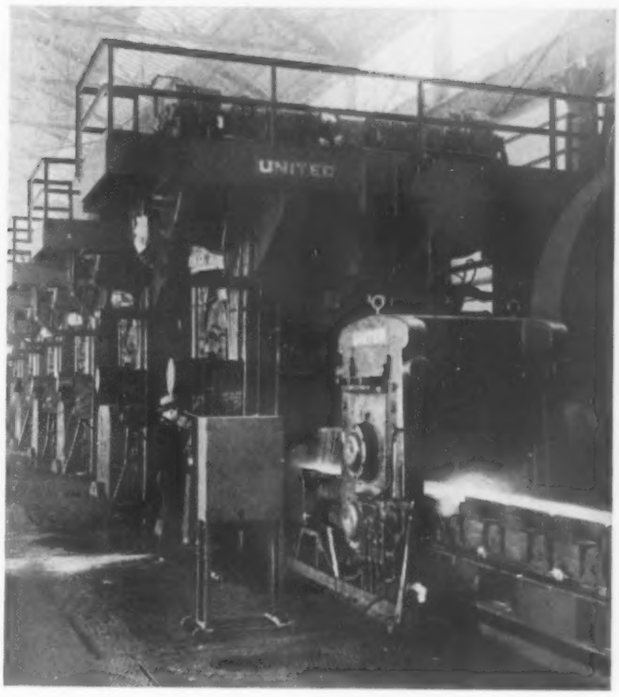


FIG. 3 — The drum-type flying shear at the end of the finishing train may be set in increments of 1/8-inch to cut sheets from 10 to 30 feet long or to end crop strip

5½-Ton Slabs Handled

Slabs for the mill will normally be furnished from the Ohio works of Carnegie-Illinois Corp., the maximum size being approximately 6¼ inches x 39 inches x 16 feet with a weight of approximately 11,000 pounds. Ample storage space under two 30-ton cranes is provided in the slab yard at the north end of the mill structure, separated from the rolling mill building. Slabs approach the three natural gas fired reheating furnaces over a heavy-duty approach table 175 feet 6 inches long. Each furnace has a hearth 18 feet wide by 75 feet long, with a capacity of 50 tons of heated slabs per hour. Three heating zones are provided in each furnace, both combustion and damper control systems being installed for temperature control. Double-ram motor-driven pushers are provided at the entry end of each furnace.

Two bumpers operating on friction draft gear are installed independent of the furnace delivery tables in front of each of the furnaces to take the shock of the hot slabs as they come from the furnaces. Extra-heavy construction is used in the discharge tables, the rollers in front of the furnaces being solid forgings. These rollers are spaced on 27-inch centers in continuous cast steel girders, a continuous trough being provided for the line shaft and miter gears. Three 35-horsepower motors furnish the power to drive this table, which delivers the slabs to the roughing scale breaker at 350 feet per minute.

A slab return table has been provided at the far end of the furnaces. This is of the same heavy construction as is the furnace delivery table and is equipped with an overhead pusher which advances the hot slabs to a set of cast-iron skids on which the slabs slide into a specially-designed slab car. This car, of heavy rolled steel construction, has the axles mounted on antifriction bearings, which is the practice followed throughout the entire mill. It is pulled up an inclined track beside the last furnace to the slab yard, where one of the cranes there repiles the slabs for future use.

Through Scale Breaker

The furnace delivery table, in three sections, is 120 feet long and feeds to a 2-high 26 x 50-inch scale breaker driven by a 500-horsepower 500 revolutions per minute alternating-current motor. Here a light pass plus the action of the roll cooling water effectively disintegrates furnace scale. This stand operates at 200 feet per minute, discharging to a table of the same type and construction as the furnace delivery table, which advances the hot slabs to the slab reducer or squeezer. This unit was

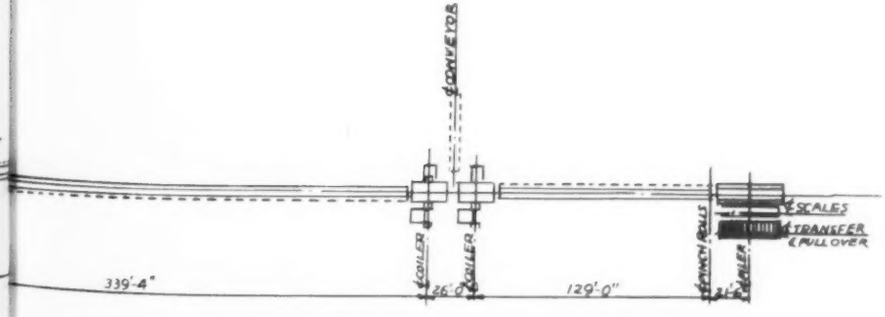
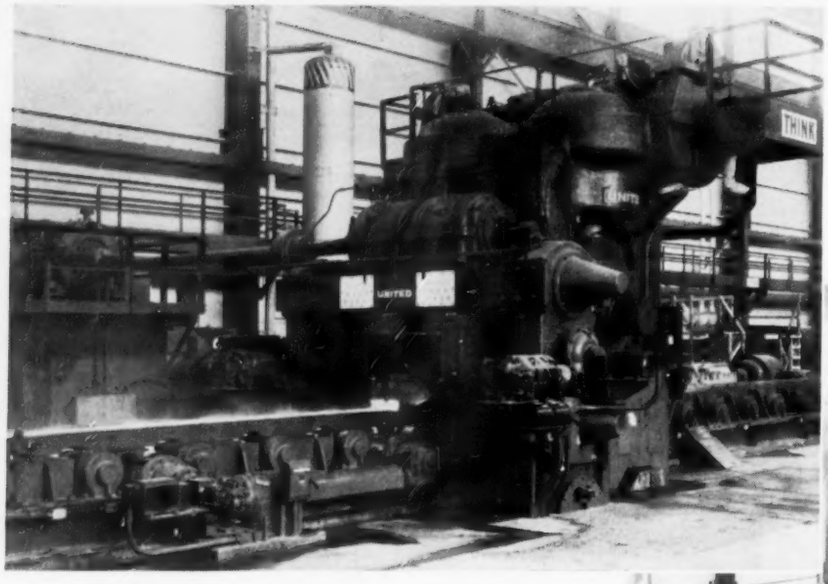


FIG. 2—Laid out with plenty of room, the new McDonald mill affords co-ordinated operation from slab yard to finished product



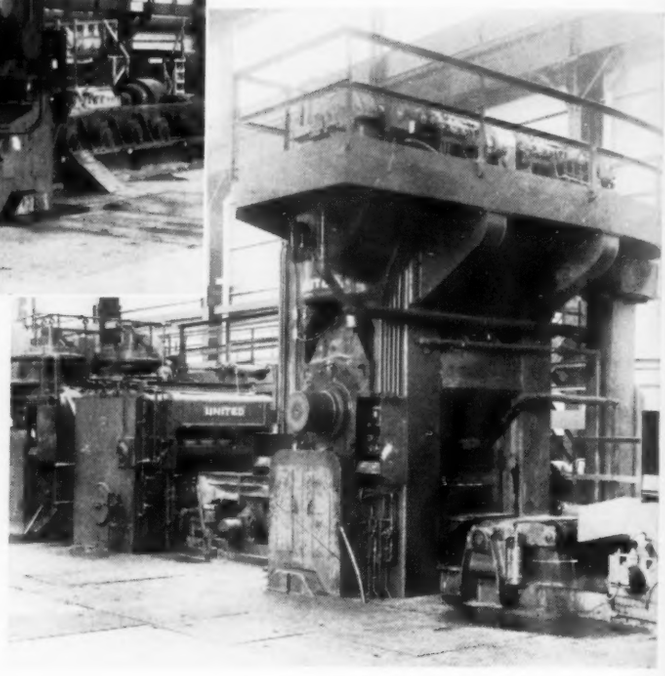


FIG. 4 (Left)—Here is shown the vertical edger immediately ahead of No. 4 roughing stand. Fig. 5 (Below) shows in the foreground the flying crop shear between the first finishing stand and finishing scale breaker

installed to avoid too great a variety in widths of slabs as delivered to the plant and is an unusually powerful unit of the bulldozer type.

The slab reducer, Fig. 1, is of heavy cast-steel construction with extra-heavy forged tension bars and is operated by a 700-horsepower direct-current motor. It is capable of reducing the width of a slab of maximum thickness (6¼ inches) by 3 inches at a single stroke, the minimum slab width being 12 inches. Side guards and screwdowns are motor operated and Selsyn transmitters and indicators are provided to facilitate setting. Entry and delivery tables at the reducer are both under the control of the operator as the slab is stationary while in the reducer. Table construction is of the heavy type with rollers closely spaced.

To Roughing Stands

On leaving the slab reducer the slab advances over a short section of heavy type roller table to the first of three 2-high 32 x 43-inch roughing stands, each equipped with 1000-pound water jets to assure complete scale removal as the slab goes through the train. The second roughing stand, 32 feet from the first, is preceded by a set of 24-inch edger rolls which provide the necessary edge rolling action and control the width of the slab. The third roughing stand is spaced 54 feet from the second and provision is made in the design to install an edger just ahead of this stand at a future date if desired.

Slabs leave the first two roughing stands at approximately 210 feet per minute and the third at 320 feet per minute. Each of these stands is driven by a 2500-horsepower 500 revolutions per minute alternating-current motor through double reduction gear drives, the roll necks being mounted in fabric bearings, water lubricated. The bearing housings are so designed that the fabric bearings may be replaced by grease lubricated bronze bearings if required. All tables beyond the second roughing stand have wide flange rolled steel girders of H-section and individual miter pots for the drives.

On leaving the 2-high roughing stands the elongated slab moves on to a 4-high 21 and 45 x 43-inch roughing stand which is a duplicate of the stands in the finishing train. This stand is preceded by an edger, Fig. 4, of the same kind as the first edger and which has 1000-pound water jets for scale removal. Sheets leave this stand at 430 feet per minute to the cooling table, which is 154 feet long.

On the Cooling Table

The cooling table is equipped with a specially-designed motor-operated rocking device and its speed is adjustable to suit the delivery speed of material from the roughing train and the entering speed desired for the finishing scale breaker. A quick-reading optical pyrometer has been installed just ahead of the finishing scale breaker to aid in controlling the entrance of the strip to the finishing mill. Provision has also been made in designing the foundations of this table to enable the new air-blast type of cooling recently perfected by United Engineering & Foundry Co. for the Ford mill to be installed at a later date if desired.

Descaled Before Finishing

The finishing scale breaker is a 2-high 28 x 43-inch stand driven by a 500-horsepower 250-750 revolutions per minute motor and is designed to operate at speeds ranging from 103 to 310 feet per minute. This stand is under close control and is equipped with 1000-pound water jets to fully remove all mill scale before the material enters the finishing train. Immediately following the scale breaker is a flying crop shear of the double-crank type perfected by United, Fig. 5. This unit will cut material to ⅞-inch thick by 37 inches wide, the knife having essentially the same action as in a gate shear, knife alignment being controlled by means of a handwheel. It is operated by a 75-horsepower shunt-wound motor through a gear drive and controlled by a load relay from the scale breaker for routine operation.

Should a cobble occur, the finishing train operator can throw the crop shear into continuous operation from his pulpit, and cut the material

into lengths convenient to handle. Cropping is done after the strip has passed the high-pressure water jets. This removes the chilled end of the strip and eliminates the possibility of marking the finishing stand work rolls. Crop ends fall into a crop box located below the shear. This may be moved out of its recess by means of a hydraulic cylinder for convenient removal by one of the overhead cranes.

Six Finishing Stands

In the finishing train, Fig. 7, are six stands of 4-high 21 and 45 x 43-inch mills designed and built by United. Housings are of cast-steel construction and all spindles are of the universal type for quiet and efficient operation. The highest grade of chrome-vanadium alloy steel is used throughout the mill for all pinions and spindles as well as pods on the work rolls. Even though less expensive material might have been used at the high-speed end of the train, alloy steel was used throughout to provide interchangeability in all stands and to handle safely the high power involved.

The first finishing stand, No. 5, is driven by a 3000-horsepower 200-400 revolutions per minute direct-current motor and delivers the strip at from 200 to 400 feet per minute. The next three stands have 3500-horsepower motors, No. 6 stand having a delivery speed of from 380 to 760 feet per minute, No. 7 rolling at from 566 to 1132 feet per minute and No. 8 at from 742 to 1484 feet per minute. No. 9 stand has a 3000-horsepower 170-340 revolutions per minute motor and will roll strip from 935 to 1870 feet per minute. The last stand, No. 10, is driven by a 2500-horsepower 185-370 revolutions per minute direct-current motor, delivering strip to the runout table at from 1018 to 2036 feet per minute. The first three stands are driven through single-reduction gear drives, while the last three are coupled through the pinion stands direct to the motors.

Roll Neck Bearings

All back-up and work roll necks on the finishing train as well as in the 4-high roughing stand, are equipped with Timken tapered roller bearings. The back-up roll neck bearings are two row assemblies 21 x 38 x 19½ inches and the bearing cones have a tapered bore. The work roll bearings are four-row units 13½ x 18 x 10 inches. These roll neck bearings were designed to give a 15,000-hour life when operating under a separating force of 2,250,000 pounds at a speed of 2000 feet per minute.

Tapered-bore bearings were selected for mounting the back-up rolls to give the added advantage of a tight fit of the bearing cone on the roll necks at the high speeds contemplated. These bearings can be removed by inserting a wedge between the barrel of the roll and the chock. If necessary, hot oil or hot air may be used to expand the bearing cone.

Built as Sealed Assembly

Ground cup spacers for the two row back-up roll neck bearings and cup and cone spacers for the work roll bearings are provided by the factory to give these mill bearings the proper set up. The assembly is locked in place on the roll necks by means of standard nuts on a threaded outer ring clamping a split inner ring. The inner filler ring is shrunk in place on the roll neck. The chock design provides a lip which fits close to the inner face of the bearing cone and as a result the bearing and chock may be removed as a sealed assembly.

A special inner closure guards against the entrance of mill scale, grit, or water. This consists of a dual-type rawhide seal with the inner lip pointing toward the bearing to retain lubricant and the outer lip reversed to prevent the entrance of water or scale. In addition to this seal, a piston ring is fitted loosely into a groove in the inner filler ring, remaining stationary with regard to the outer closure retaining ring which is bolted in place, thus providing what amounts to an extra labyrinth to protect the bearing against scale or water.

The fixed chocks in all stands in the McDonald mill are provided with a new and unique method of clamping, Fig. 8. Filler plates and adjusting wedges have been eliminated. To do this required a high degree of precision in the machining of the housing and chocks as well as in the setting of the housings on the foundations. In place of the customary

FIG. 6 (Below)—A view of the high-speed runout table at end of finishing train, looking toward the coilers and piler. Fig. 7 (Right) shows the finishing train with the finishing scale breaker and flying crop shear in foreground

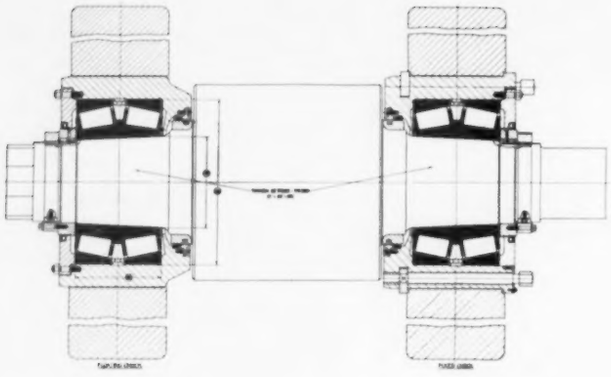


FIG. 8—Roller bearing and mounting used on back-up roll necks in all 4-high stands in roughing and finishing trains, showing latch for locking chocks in place

clamp plate bolted in position, the fixed chocks in this new mill are held in place by latches which are part of the chock. In the new design, the keeper plate is inside the housing and is pressed and keyed on a shaft which extends through the chock, a hand lever being attached to the outer end as will be seen from the illustrations. Two of these latches are used on each fixed chock, all types of bearing mountings being so adapted in this mill.

Roll Changes Speeded

All mill stands are equipped with hydraulic roll balance and provision made for quick roll changing. A specially built C-hook is used to remove the back-up rolls, and a roll changing sleeve facilitates work roll changes in the 4-high mills. The edger rolls are mounted with the bevel gears separated from the rolls by a wobbler. This has a ledge on the top which allows a special hook to get hold of the coupling box and raise it to the top position, where a latch is provided to hold it. This allows the vertical roll to be removed without difficulty, the same special hook being used.

The chutes and loopers between the finishing stands are of the specially-designed United withdrawal type, the guides and stripper being mounted on carriages which can be moved back from the rolls easily when it is necessary to make a roll change. Side guards are all motor operated.

Extensive use has been made of Selsyn control devices for indicating roll and side guard settings. Twenty-eight units are installed in connection with the screw downs on the 4-high stands of the finishing train and the 4-high roughing stand, both sides of the stands being so equipped. Twelve transmitters and receivers aid the operators in setting side guards; three units are used for indicating mill roll openings in connection with the three 2-high roughing stands, and two sets of Selsyn transmitters and receivers are installed in connection with the slab reducer. These electrical aids make it possible for one man to set the rolls, guides, or guards quickly, easily, and accurately. Indicators are mounted on the mill housings and adjustments made by push-button control.

As material leaves the last stand of the finishing train, it goes through a drum-type flying shear, Fig. 3. The flying shear may be set in increments of ⅛-inch to cut sheets from 10 to 30 feet in length or to end crop strip. The wide range of lengths required made necessary the use of more than one drum on this shear, so to facilitate drum changes a special housing was designed. The housing fits into a tapered socket which holds it rigid without bolts or keepers. By disconnecting the universal spindle which drives the bottom drum, the housing assembly can be removed without difficulty and a complete new assembly installed quickly and easily. Automatic control of the flying shear is provided through a load relay operating from one of the finishing stands.

Individually Driven Rollers

Strip or sheets passing the flying shear advance over a runout table, Fig. 6, capable of handling material at 2300 feet per minute, the table rollers being individually motor driven. All rollers are mounted on antifriction bearings, Timken bearings being used on the motor side, as is the case throughout the mill. The first hundred feet of the runout table is equipped with spray curtains and aprons so designed that cooling sprays may be applied to the material from below as well as on the top. At the end of the table, which is 322 feet long, are two United hot coilers capable of handling strip at 2300 feet per minute, and having a maximum opening of 5 feet. The inside diameter of the coils is 30 inches.

As the McDonald mill is designed to produce the heaviest coil per unit width as yet attempted, particular care was exercised in designing the coilers. These are unusually heavy for their width to assure rigidity and the coiler rollers are hardened and ground. Each coiler is equipped with a pneumatic ram to push the coils off the reel on to a transfer carriage which in turn deposits them on the coil conveyor, a separate carriage being provided for each machine. Special provision is made at all points to prevent coils from being edge marked and remarkable success has been attained in this important phase of production.

The table which precedes the piler is of the same construction as the hot runout table, rollers being 10 inches diameter and 42 inches long, spaced on 24-inch centers and individually motor driven through flexible couplings. Spindles on the pinch rolls which feed the depression-type piler are driven by a variable-speed motor through a flexible coupling. Maximum provision is made here to take care of the wide variation possible in length and thickness of sheets as well as the speed at which the sheets may come from the table to the piler. The piler, Fig. 9, has a capacity of 15 tons.

Operation of Piler

Cast-iron platens, raised and lowered by screws operated by totally-enclosed bevel gearing, motor driven of course, are used on the piler. The side guards are also motor driven and are designed with sufficient flare to function as a trough for collecting the pile, thus avoiding hand labor. As the pack sinks in the piler, it comes to rest on a chain conveyor which moves it horizontally across a recording scale to a specially-designed deck. This deck is of heavy steel construction with special deep V-grooves in which the crane hooks or "hairpins" used for carrying the packs can be set with a minimum of difficulty.

Four strategically located grease and oil houses feed 15 lubrication circuits which cover the entire hot mill. Several of these circuits are fully automatic, functioning several times a day under time clock control. Others are semiautomatic, operating only when a switch is closed.

Fabric bearings on the roughing stands are water lubricated, using water from the mill system at approximately 25 pounds pressure. Gear drives, screwdown gear systems, and pinion stands which are all equipped with antifriction bearings, are lubricated by two Bowser continuous circulating oil systems, each circuit being supplied from a 7000-gallon storage tank. In these tanks the oil is automatically maintained at the proper temperature. Gear drives are furnished with 1600-1800 viscosity (100 degrees Fahr.) oil, and pinions with 2400-2600 viscosity (100 degrees Fahr.) at 35 to 40 pounds presure. All oil is pressure filtered before being returned to the storage and supply tanks. Each oil system has a capacity of 325 gallons per minute.

Grease is used to lubricate all the

antifriction bearings on the finishing train roll necks, screwdowns, tables, etc., from the furnace end of the mill on through to and including the coilers and piler. Approximately 2700 points are lubricated by the grease circuits, Trabon systems being used. This lubrication is all either fully automatic or semiautomatic, and covers the movable as well as the fixed points. In fact, this mill is thought to be the most completely automatic or semiautomatically lubricated steel mill in the world. Alarms and indicators are installed at all principal points on all lubricating circuits to assure a constant and unfailing supply of lubricant at all times.

In an adjoining building additional equipment is provided for the further processing and finishing of the hot coiled material and cut sheets. As previously mentioned, coils start toward the coil finishing department on a heavy chain conveyor. This takes them from the coilers to a gravity turn at right angles to the flight conveyor. This turn feeds the coils to another chain conveyor which delivers them to a specially-designed pallet type conveyor running parallel to the main axis of the finishing building.

Avoid Marring Material

All conveying and coil transferring equipment is specially designed with the idea of avoiding coil marking, turned edges, etc. Such details as size and spacing of rolls in roller sections of the conveyor system, special side guards, etc., have been watched closely. The pallet conveyor may be operated at a constant speed or its rate of travel regulated from a pulpit in the finishing department so as to gain the maximum cooling of coils on the conveyor without slowing down the coilers. Sufficient conveyor length is available that coils may be taken directly from the conveyor and placed in railroad cars for shipment. Normal practice, however, is for the coils to be taken from the pallet conveyor by a magnet and placed in storage or passed on to the finishing and processing lines.

A gravity-type conveyor with closely spaced roller runs across the end of the finishing department. From this the coils are fed to storage conveyors leading to three finishing units. One of these lines is known as the coil processing line, where the strip is uncoiled, processed to prevent coil breaks, etc., and recoiled. A crane is available to take coils from this line and transfer them to other units for edge trimming, slitting, or shearing to length, or to move them to cars for shipment.

The second finishing line provides for edge trimming or slitting coiled stock. Equipment is available for uncoiling, trimming, slitting, relevel-ing, and recoiling. The combination edge trimming and slitting machine uses removable arbors, provision being made to cut strip into seven multiples. Two recoilers are installed in this line, alternating in operation if the strip is merely edge trimmed, or one unit handling four narrow strips and the other three if the strip is being cut into seven multiples.

Coil shearing is handled in the third finishing line, a Hallden flying shear capable of operating to close tolerances at speeds ranging from 100 to 300 feet per minute being installed for the purpose. With this, of course, are the necessary pieces of equipment for uncoiling, looping, and leveling.

Pack Handling Expedited

Special provisions also have been made for handling packs. From the piler the pack is picked up by a crane while still hot and taken to a convenient storage area for cooling and self annealing. After it has cooled it may be shipped or taken to a cross conveyor which delivers it to a tilting table from which it goes on through a 17-roll leveler and an upcut shear. This line is used only for black cut-to-length materials. The third alternative is to move the cold pack to a 50-ton electric transfer car which runs at right angles to the axis of the mill and serves four buildings, all of which are under one roof.

A four-arm batch pickling unit is provided which will handle pack material up to 20 feet in length. This may be supplied with hot sheared material from the mill or sheets sheared from coils in the finishing lines previously mentioned. The transfer car also brings material to the skin pass mill or to the 115-inch wide, 85-foot long continuous gas fired normalizing furnace.

Two pack finishing lines in addition to the one used for black sheet have likewise been installed, one for finished cut-to-length material and the other for cut-to-length and slit material. These lines are equipped to take pack stock from 18-gage to ⅜-inch in thickness and level and shear it to close tolerance, re-level and oil the sheet or strips for shipment. The combination edge trimmer and slitter in this department, as in the coil processing department, will cut sheets into 7 multiples or less as desired. Where it is desired to furnish cut-to-length special surface stock, the runout table on one of these finishing lines is equipped with fiber pads to eliminate the possibility of scratches.

To round out the equipment a 2-high 28 x 48-inch skin pass mill is installed. Likewise a 156-inch squaring shear capable of handling pack sheets from 10 to 30 feet in length and up to ⅜-inch in thickness is available.

Lighting, Heating Facilities

Special provision has been made throughout the entire mill for natural lighting as well as artificial illumination, for good light is one of the features necessary for the production of high-quality strip and sheet. In the finishing departments overhead steam unit heaters have been installed so that comfortable working conditions can be easily maintained even in the coldest weather. Adequate ventilation is likewise provided, making the whole mill one of the most comfortable and pleasant plants yet erected.

All main motors and switch boards are grouped in a special air conditioned motor room, all direct-current equipment being Westinghouse. The motors are ventilated and cooled by ducts from the pressure basement below the motor room. Overhead ventilating ducts equipped with motor driven fans provide for recirculation of the cooled and filtered air in this room, and motor-driven roof ventilators remove the heated air.

Adjacent to the mill building is the

(*Please turn to Page 57*)

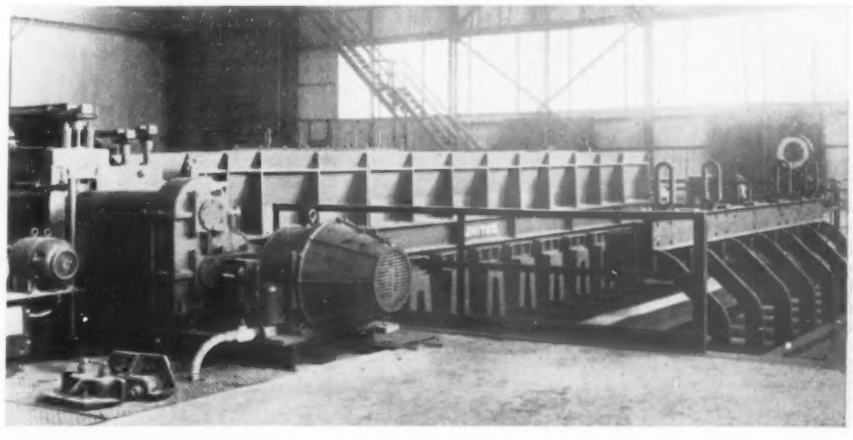


Fig. 9—The sheet piler at end of hot strip mill has a capacity of 15 tons. A chain conveyor moves packs horizontally across a recording scale to the crane deck

Progress in Steelmaking

Annealing Prevents Cracks

At an English plant it was found in casting 12-sided ingots of 14, 17 and 19 inches diameter into molds that the initial ingot invariably cracked vertically at one or more of the corners. By annealing the molds at about 1472 degrees Fahr. before placing them in service, the phenomenon was avoided. The practice of casting an ingot of slag into new molds before using them for steel now is followed.

• • •

Affords Smooth Operation

A new crane bridge drive has the motor located at the center of the span and close to the girder. Both ends of the motor armature are coupled to gear reductions which operate in oil-tight cases. These are cast or welded integral with the trucks or end carriages. This arrangement affords a narrow footwalk of uniform width the entire length of the crane which in turn provides more bridge travel and floor space coverage, lower torsional stresses, smoother operation, and the use of low-torque brakes at each end of drive.

• • •

Loss of Steel Is Reduced

Acid consumption as high as 120 pounds per ton of rods cleaned and a consequent loss of steel of 2.25 per cent were reduced by a wiremaker merely by the inauguration of chemical testing of the acid bath. Under former practice no attention was paid to acid control, testing of solutions or inhibitors. Within a few months after acid testing was instituted at this plant the acid consumption was reduced to 50 pounds per ton of rods cleaned and the steel loss from 0.95 to 1.15 per cent. Further favorable results were obtained by the use of an inhibitor.

• • •

Steel Rolls Widely Used

Steel base rolls are empoyed widely for the flat rolling of steel in blooming, slabbing and bar mills. Rolls of this grade also are used in 4-high strip mills for backing up the work rolls. Steel base rolls have been improved greatly by the manipulation and use of alloys, and by progress in foundry and heat treating practices.

• • •

Lowers Cost of Reduction

Approximately 50 per cent is saved in the cost of cold rolling steel strip at one of the broad strip mills in this country. Coils of hot rolled strip delivered from the pickling department in 150-foot lengths are welded end to end in pairs to make a 300-foot coil. Reducing a single coil 300 feet long rather than two 150-foot coils on the 4-high reversing or multiple-stand continuous 4-high cold mills, involves less time in loading and unloading the coilers, affords higher production and less scrap loss and, consequently, minimizes the cost of reduction.

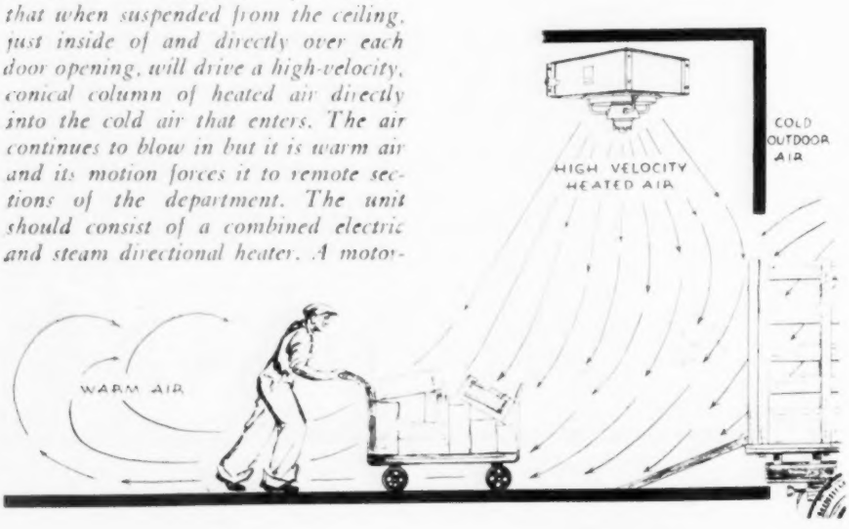
• • •

Life of Reels Is Extended

Reels for coiling hot strip steel on the interior of the heating furnaces which serve the Steckle-type mill now are being made of stainless steel containing 28 per cent chromium. Reels made of ordinary steels were found to oxidize rapidly, and loose much of their strength when exposed to temperatures over 1600 degrees Fahr. at which the coiled stock is heated. Because of high resistance to scaling temperatures and to the corrosive effects of the furnace gases, afforded by stainless steel, the life of the reels has been extended many times that of plain carbon steel.

Heats Inrush of Cold Air at Loading Platform

For years the problem of heating economically and effectively the entrances to shipping and receiving departments in steel plant warehouses has been a constant objective. A method recently devised by J. M. Hancock, New York, involves the installation of a heater that when suspended from the ceiling, just inside of and directly over each door opening, will drive a high-velocity, conical column of heated air directly into the cold air that enters. The air continues to blow in but it is warm air and its motion forces it to remote sections of the department. The unit should consist of a combined electric and steam directional heater. A motor-driven fan draws a large volume of air through a copper steam coil and gives it high velocity downward direction and penetration. The unit should allow the amount of heat to be adjusted without affecting the speed of the fan



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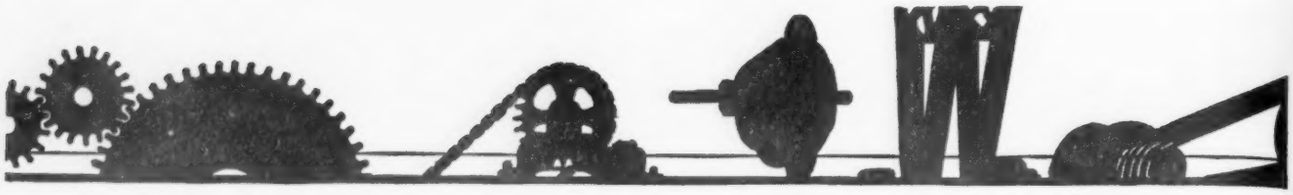
Power Drives



Belt Flexure

COMPRESSOR drives, because of the shock and fluctuating operating load, usually require some device for equalizing the varying tension and the resultant change in belt length due to the natural, and necessary, elasticity in the belt. On many installations gravity idlers serve this purpose but add a reverse flexure or bending strain to the normal flexures around each pulley. This results in three flexures per circuit of the belt instead of only two as in the ordinary belt drive with two pulleys.

In one compressor installation, for example, a 26-inch belt operates at the relatively high speed of 4900 feet per minute driving from a 26-inch, 250-horsepower motor pulley to a 96-inch compressor pulley on 8-foot centers with a 26-inch idler pulley. All pulleys are 31-inch face. This means about 270 flexures per minute over the driving and driven pulleys and an additional 135 reverse flexures.

Shorter Life But Less Slippage

It is chiefly these flexures, particularly the added reverse bend, and slippage which wear out a belt. Also, an open drive on such an installation would have a belt between two and three times as long as this short-center drive. Thus, each belt fiber on the open belt drive would receive between one-third and one-half as many flexures per minute. For this reason short-center drive belts may be expected to have a shorter life than a corresponding long center belt. This shorter life, however, is largely compensated for by a decrease in amount of belt required.

The long center drive without the idler is likely to have more slippage. Special belt surfaces and tannages reduce this slip to a minimum on properly designed short-center drives which maintain tension. These same types of belts are more flexible and thus bend with less fatigue to the belt fibers and therefore add to the belt life.

Within the last few years the development of the pivoted motor base has provided a type of short-center drive which maintain tension during operating fluctuations in load without the additional reverse bend or flexure. Since insufficient tension or overload also cause slippage, factors which are corrected with properly designed balanced motor installations, such drives increase belt life as well as add to the efficiency of operation.

• • •

Sprocket Repair

THE teeth on the bull sprocket on an overhead conveyor drive wore so rapidly that two or more sprockets were required for each chain. Replacement not only stopped production but a new sprocket cost about $125 and required a gang of men to handle the change.

Now, instead of replacing the sprocket as the teeth wear, they are built up by welding. Also a piece of steel is welded into the space between the teeth to build up the sprocket to its proper diameter and also provide a better wearing surface.

It is not necessary to remove the chain as the welding is done on the open side of the sprocket which is turned as necessary. The welded surfaces are smoothed down and shaped with a portable grinder. The repair is made by one man in a few hours and can be done out-of-hours or any time that the conveyor is idle. The chain operates at slow speed, so slight inequalities in tooth contour have no serious effect upon the operation.

• • •

Conveyor Drive

AN ATTEMPT to drive two assembly conveyors, one feeding to the other, from a single motor did not give satisfactory operation of the second conveyor as it was too difficult to maintain sufficient tension in the conveyor belt to obtain a good friction or driving contact on the driving pulley.

An analysis of the drive quickly indicated that instead of merely pulling the conveyor belt around the opposite or discharge pulley the drive was attempting to push the belt along on the conveyor. In other words the slack side (without tension) was on top and instead of this slack being taken up immediately by the pull around the opposite pulley, it simply slipped back and loosened the belt on the drive pulley. The drive was always difficult to start without "helping along" to prevent burning.

Such drives are possible by adding idlers, tighteners, or using tandem or "hugger" drives. In this case the plant was large enough for the motor to be readily usable elsewhere and so two smaller motors were installed, one for each conveyor.

• • •

Bearing Life

HOW long will an antifriction bearing last? There are too many factors outside of the quality of the manufacturing and material to give any assurance beyond that of the maker who guarantees a life long enough to show up defects in manufacture. However, care in installation and lubrication, especially the proper lubricant, are the factors which really determine life not only of the antifriction type, but of all bearings.

Imperfections in such types of bearings never have been an important factor. With the developments in design, accuracy of manufacture, and particularly heat treatment, defects probably will be even less important in the future.

That antifriction bearings do last when taken care of is shown by the experience of one plant which purchased a spare bearing when several hundred were installed in their plant because they could not believe that their bearing troubles were over. (Bearings were not available from local supply houses at that time.) It had not been needed for replacement 18 years later.

In another plant only one of 75 bearings installed 14 years ago has failed and that soon after installation due to a hidden defect in the ring. Other plants may have still better records. This department would appreciate receiving from readers details of their experiences with these bearings.

"SMALL PART" FORMERLY COST 2½c NOW ⅞c

● A large motor car manufacturer used a considerable number of "small parts" of an intricate type in each automobile. Hot-forged and machined they cost 2½c each. His engineers and Manville's went into a huddle. Result: The "small part" costs ⅞c now. It is cold-forged on a Manville Heading Machine.

Manville Cold-Processing is saving millions of dollars yearly in the manufacture of small parts, rivets, bolts, nuts, etc. Manville cold-forging largely eliminates metal wastage, as well as saving machining. In the past 5 years, Manville engineers have tackled and solved many a new problem. They will be glad to tell you whether you can cold-forge some article you are now hot-forging and cut costs accordingly.

It is well to remember that Manville has been the quality name in cold-forging machinery since the infancy of the art. Headers, Re-headers, Thread Rollers, Slotting Machines and Presses by Manville get the work out fast, economically and reliably. Your inquiry will receive prompt attention.

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Surface Treatment

Protective Materials in Use for Outdoor Structural Work

PROTECTION of structural steel and all types of outdoor equipment of steel has been of vital importance since the day steel was developed, and the efforts of chemists and engineers have produced a bewildering array of materials from which to choose.

To select a protective material for steel intelligently, one must have some conception of the theory of corrosion and a knowledge of the composition of paint. Everyone has seen a wet battery which uses zinc and copper or carbon electrodes; as the battery is used the zinc goes into solution gradually, which in reality amounts to corrosion. A battery of this type can be made using almost any two different metals, with varying degrees of success.

Steel, or any other metal for that matter, is not homogeneous, and infinitesimal variations in composition occur throughout any given piece. In addition to this, the air is full of dust and dirt which settle on the metal and also furnish a second material to form a battery. All that is needed now is water and nature furnishes plenty of that. Consequently countless galvanic cells are formed on the surface of the steel and it rusts at all the anodic points, forming pits and patches of rust.

There are other theories of corrosion but regardless of what theory one accepts or believes in, the fact of the matter is that in order to prevent corrosion from taking place, it is necessary to cover the steel against the action of everything that causes rust or corrosion to develop. The common material is paint.

A knowledge of the composition of paint is of primary importance in enabling the buyer to judge for himself in advance whether or not a paint is suitable for the purpose for which it is intended. Under the circumstances, the natural and justified inclination of those in charge of painting operations is to turn to materials of which the composition is known and *those in particular which have stood the test of time on jobs on which accurate data are available.* Thus again, the need for an accurate and thorough testing program by users of paints, lacquer and enamel is emphasized.

Avoid Soluble Compounds

Metal protective paints should contain no pigments which form water soluble compounds or promote chemical action within the dried paint film. Chemical action always involves a change in volume, and such changes set up stresses within the film which tend to disintegrate it. Everyone has seen examples of this in some paints. Soluble compounds, when they are washed out, leave the binder porous and without protective value.

Besides having no harmful effects on the vehicle, the pigment should have no tendency toward a harmful effect on the metal which it is expected to protect. Sulphide pigments, for instance, are not advisable for use in paints for metals, because compounds may be produced which stimulate corrosion.

IT IS generally believed, at present, by competent paint technologists that there should be about 30 per cent by volume of opaque pigment in the dried paint film of the priming coat for maximum durability. This means that a gallon of red lead paint, for instance, should contain at least 20 pounds of dry red lead. For a durable chromate primer it means that about 15½ pounds of basic lead chromate should be present in a gallon of paint, notwithstanding the fact that there are on the market chromate primers which contain only one or two pounds of lead chromate.

There has been considerable discussion regarding the ability of chromate pigments to inhibit corrosion of steel when used in paint films. A theoretical discussion of this matter has no place here—we are interested in results. The addition of lead chromate, red lead or other lead pigments to iron oxide paints undoubtedly will improve them, but the simultaneous introduction of equal or greater volumes of inert extending pigments will probably more than neutralize the beneficial effect of the addition of the good pigment.

An examination and analysis of some of the so-called chromate primers now on the market will show them to consist largely of iron oxide and inexpensive extender pigments. Although iron oxide pigments possess great spreading power and opacity, and paints made from them are cheaper than lead paints, they are, however, variable in quality and may contain corrosive basic sulphates of iron, and so promote corrosion which basically they are intended to prevent.

Red lead primer has protected untold millions of square feet of outdoor structural work for many years and probably will continue to do so for many more. However, red lead has its drawbacks and it is possible to obtain a greater degree of protection at varying costs. Basic chromate, especially in one of the newer synthetic vehicles will give a hard and durable finish, bearing in mind, of

t and Finishing

course, what has already been said about some chromate primers. Another primer which deserves consideration because of its past performance and reputation is basic lead sulphate (blue lead). The lead sulphide which is present to some extent does not seem to have any harmful effect, undoubtedly because it is compensated for by the large amount of basic lead oxide present. The three materials mentioned can be used as a basis of comparison for any new materials which may be developed and offered for sale without much of a background in the way of field trials or testing programs.

Zinc pigments cannot be ignored, especially basic zinc chromate, but zinc pigments have a tendency to "chalk" and should be used in conjunction with lead.

Pre-Treatment Advisable

A recent advance is the chemical treatment of the base metal prior to the application of paint. This subject has been covered in previous articles. Briefly, chromate processing is strongly recommended for steel prior to painting; similarly, a zinc phosphate treatment is urged for galvanized surfaces. The low cost of these treatments and their successful use in the automotive industry shows great promise. They, at least, pay for themselves in increased life of the finish applied and consequently, the base metal.

Sprayed molten metal offers splendid protection, which in many cases is better than any paint finish which could possibly be applied. A more complete discussion of this can be found by referring to the Feb. 25, 1935, issue of STEEL.

BRIEFLY then, primers which have stood the test of time are: Basic lead chromate, red lead, and basic lead sulphate. The many recently developed primers should be compared against these in a test program before making any decision either for or against them. The matter of adulterants in the above three primers is a matter for a chemist to determine. The use of chemical surface treatment prior to painting is strongly recommended.

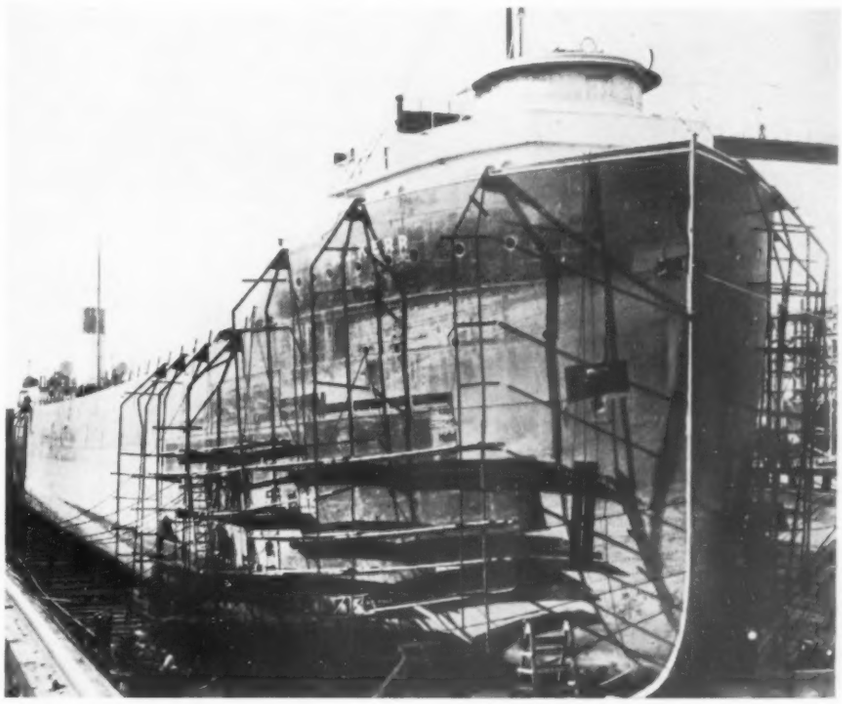
Spray Corrosive Acids with Gun of Molded Plastic

For spraying corrosive acids, such as dilute sulphuric acid on storage battery plates, formaldehyde, silver nitrate, mercuric acid and the like, a Bakelite base spray gun has been developed by the DeVilbiss Co., Toledo, O. The gun has fluid action and is semiautomatic. Glass containers usually are used with it.

Emulsion Degreasing System

Magnus Chemical Co., Garwood, N. J., announces a new cleaning method known as emulsion degreasing. It gives the effect of vapor degreasers plus the action of a soap solution and the combined effect is said to result in a more effective and complete job and at a lower cost than entailed with ordinary degreasing methods.

In Water 27 Months



EFFORTS of marine vegetation during the past 27 months to attach itself to the submerged portion of the D. G. KERR *were in vain. And for at least another 24 months, inspectors of the ship's hull have indicated, continued efforts will result in failure. Rust and corrosion also have been unable to make any headway. The double resistance of the hull was obtained by application by the Pittsburgh Steamship Co. of an anticorrosion paint developed by the Sherwin-Williams Co., Cleveland. The first step in developing the resistance in the hull was sandblastng to scour and thoroughly dry the area that could be painted immediately with the first coat of red lead. The lead was allowed to dry for 36 hours, after which the coat of waterproofing brown was applied. The ship was then refloated quickly so that the waterproofing coat would not be exposed to the air longer than necessary*

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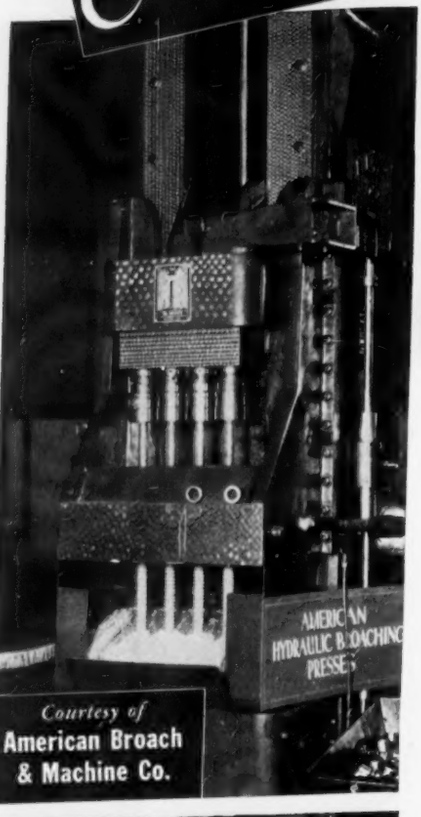

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What Sunoco has done for others, it can do for you. We suggest a test in your own plant under your own conditions. That will tell our story better than we can.

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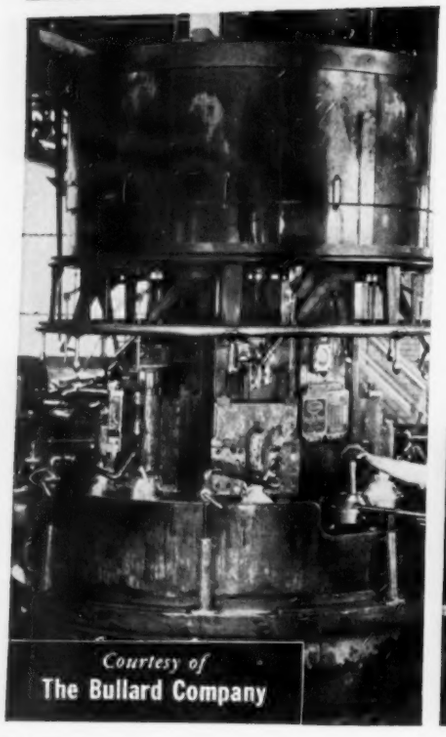
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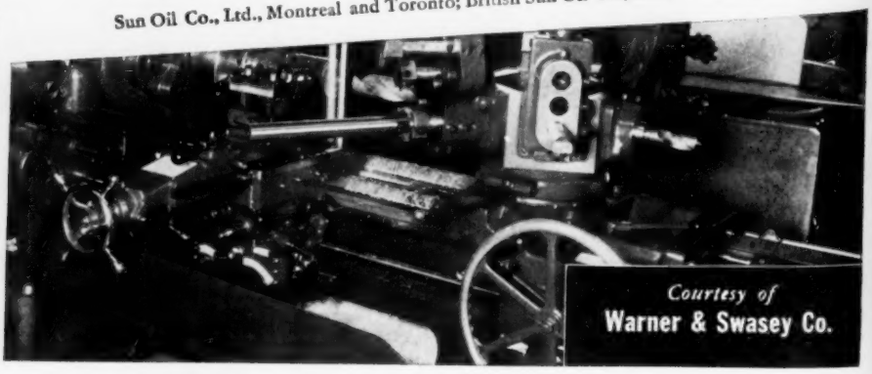
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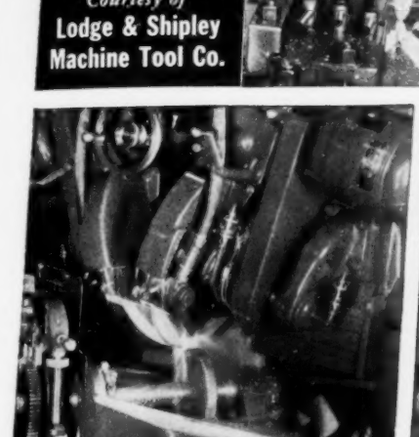

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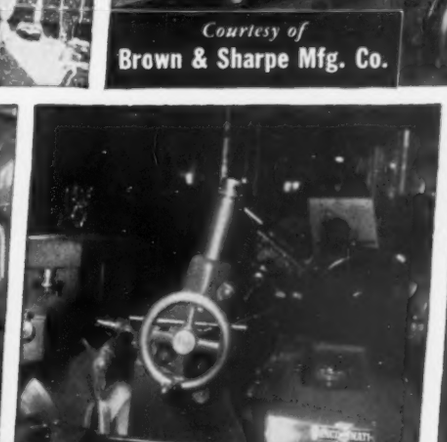

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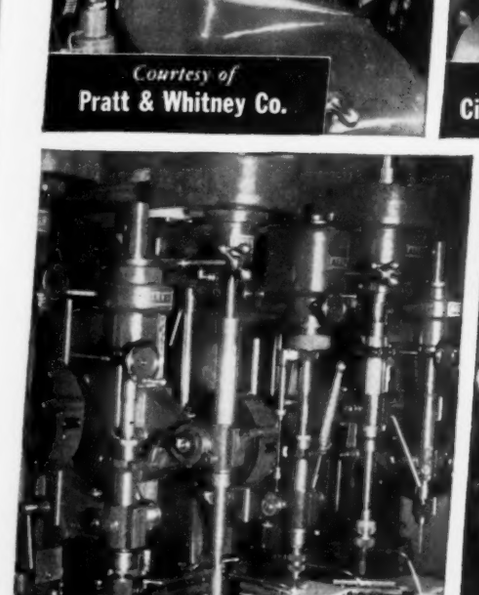

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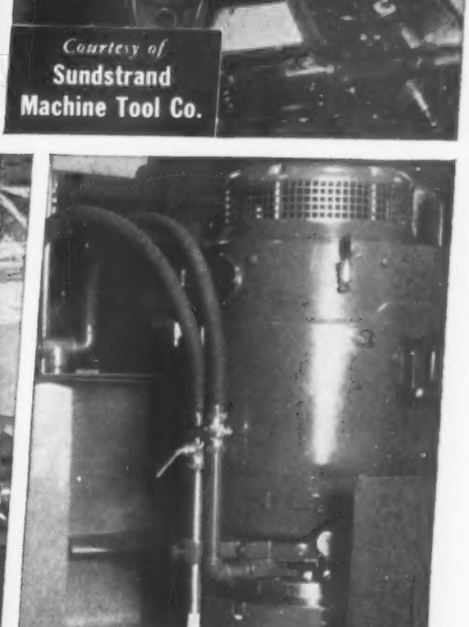

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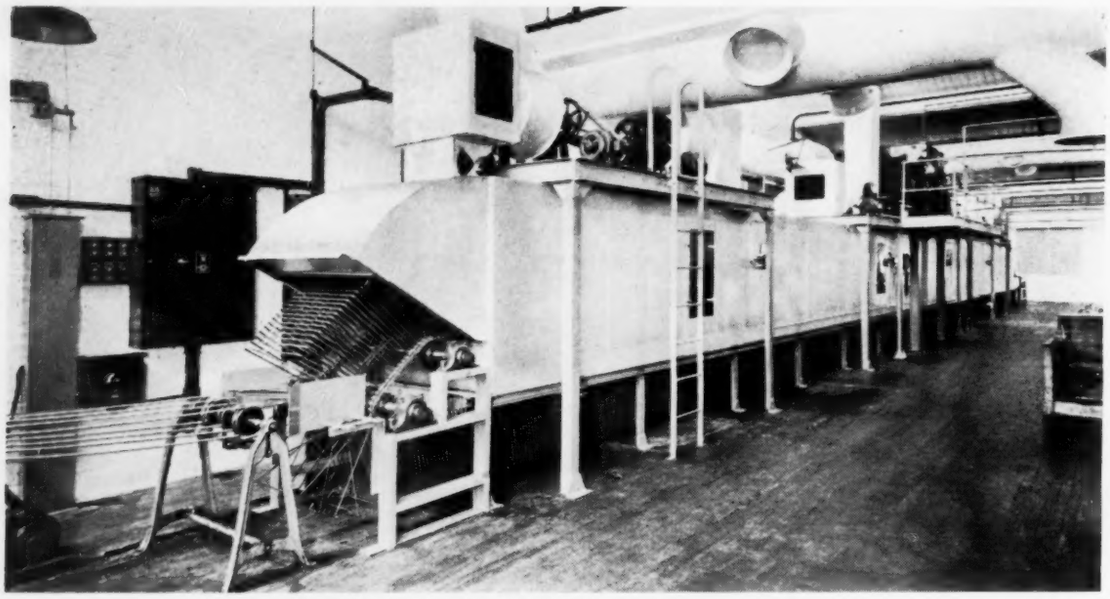


Fig. 1—View of oven from feed end, showing the finger bars, hood, fume fan and zone circulating fans. The air heating system and temperature control apparatus are mounted on the platform at the center of the oven. A close-up of this equipment is shown in Fig. 3

Metal Decorating Oven Built To Turn Out Exacting Work

COATING and decorating of metal sheets for the manufacture of packages, cans, caps, crowns, toys, signs, and other products, has become a major industry. As this field has expanded, new finishes have been developed, finer and more exacting work is required, and production demands have increased. Thus, manufacturers of these products have found it necessary to modernize their facilities, particularly oven equipment.

Present demands require baking ovens incorporating automatic control, uniformity of temperature across the sheet, ability to maintain any predetermined temperature curve throughout the length of the oven, elimination of fumes, control of oven atmosphere, use of the lowest cost fuel, safety and economy of operation, rapid and adequate cooling, all built into a sturdy and compact unit. With these requirements in mind, the J. O. Ross Engineering Corp., New York, has designed and announced a completely new metal decorating oven.

This oven shown in the accompanying illustrations, is supported on steel frames rigidly welded together in sections to facilitate erection and permit standard construction for various lengths of oven. The hot zone is enclosed in insulated panels composed of two metal sheets separated by rock wool insulation; the joints permit expansion and yet have a minimum of through metal to reduce heat loss. Access doors are provided at several points along one side of the oven to permit inspection. When assembled, the oven appears as a single unit and is air tight to prevent fumes escaping to the room.

Conveyor finger bars are made of cold rolled bar stock welded and formed to fit rigidly in the conveyor chain and are readily removable. Shaped so that they adequately support either large or small sheets, the bars are supported on roller chains with special fittings, into which they are placed. Each link also is provided with an attachment which permits the chain to bend only in one direction, thereby keeping it rigid through the oven so that the space between the bars is maintained.

The chains travel on steel riding

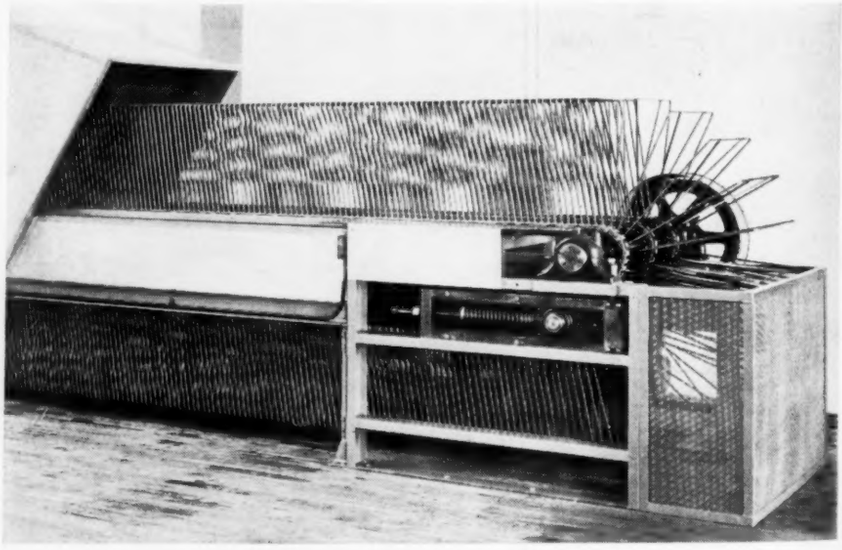
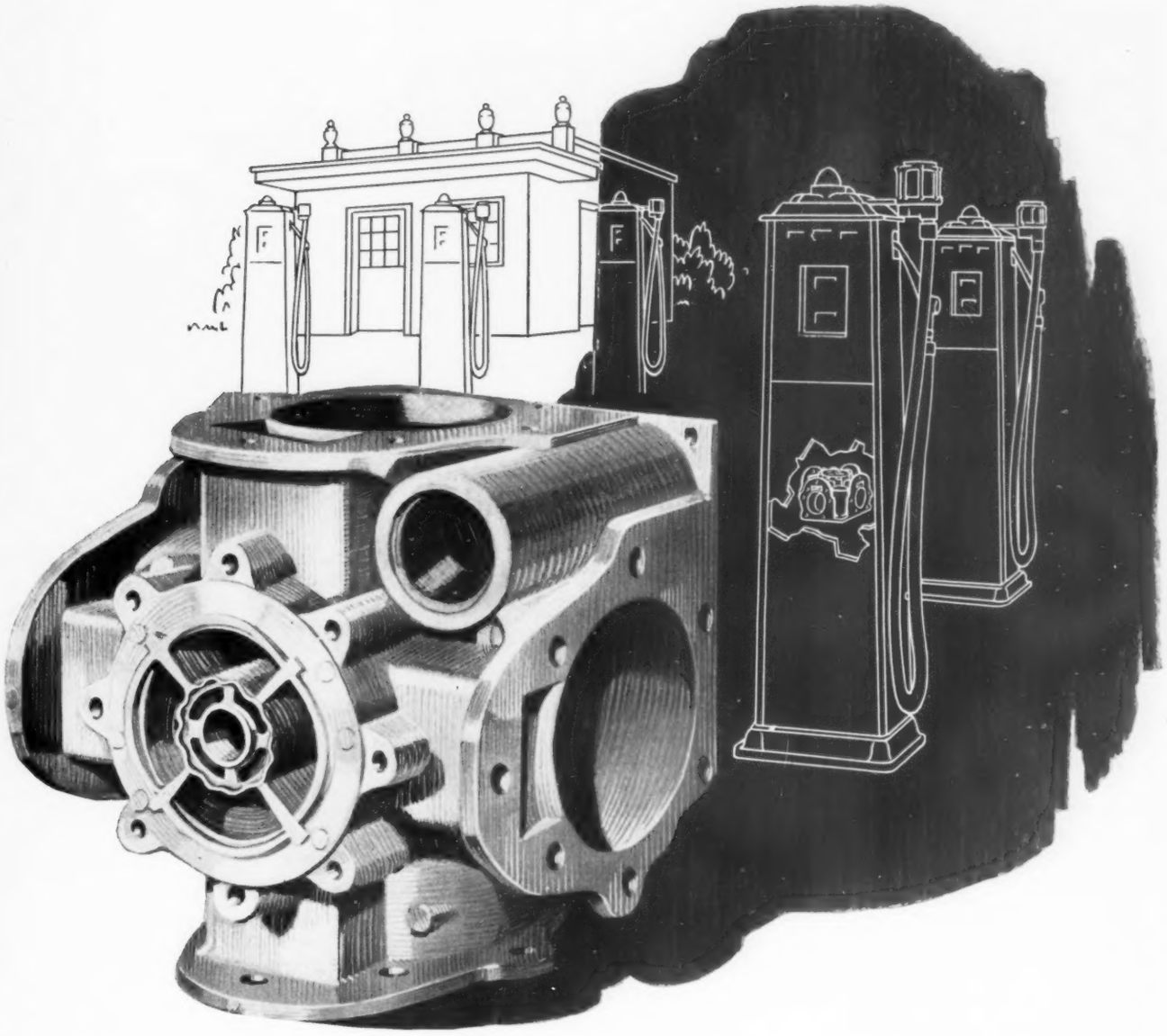


Fig. 2—This close-up of the unload end of the oven shows the uniformity of the finger bars, structural steel stands, heavy-duty roller bearings and the spring take-up

ZINC ALLOY DIE CASTINGS



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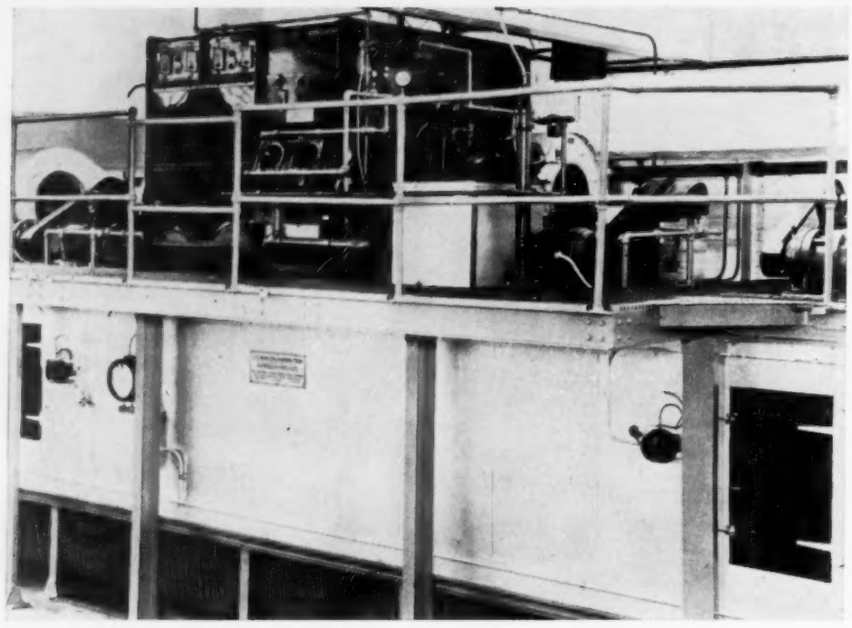


Fig. 3—The air heating system is placed on a platform over the center of the oven. The heater shown is the indirect oil-fired type. Below the platform can be seen two of the inspection doors, the temperature recorder controller for the heater and the zone temperature controllers

strips supported on angle iron tracks and provision is made for expansion. Sprockets are machine finished and shafts are set in roller bearings supported on structural steel frames. At the unload end, shown in Fig. 2, a machined spring takeup is provided to keep constant tension on the conveyor chain. On the longer ovens, a lay shaft driving through reducers at both ends is provided. Drive may be synchronized with the press or coating machine.

Source of heat is a Ross-Harrison air heater of either the direct type, in which products of combustion pass into the oven, or indirect type, in which only clean fresh air enters the oven. Either type can be furnished with gas or oil burners. The heaters may be placed on the floor alongside the oven, or on a platform above the oven, as shown in Fig. 3, the latter construction being generally used to save floor space. Heaters and burners are provided with all the necessary safety devices, and, since there is only one central heater unit, a single effective and accurate system can be used.

The oven is divided into several controlled zones, the number depending on its length, each zone having its own circulating fan, thermostatic control and distributing duct work. Fans are of the full-housed centrifugal type, designed for high-temperature operation. Sheet metal in the duct work is heavy gage and is rigidly braced. All exposed hot air ducts and fans are insulated with rock wool blankets and insulating cement.

At the load end a hood is provided, as shown in Fig. 1, to prevent spill of volatiles and hot air into the room. A separate fan is employed to remove these gases from the first section of the oven where the volatiles are given off most rapidly. At the end of the hot zone is a cooling section consisting of a centrifugal fan which takes air either from indoors, outdoors, or any available source of cool air, and discharges it through a series of special-shaped streamline nozzles uniformly up through the sheets.

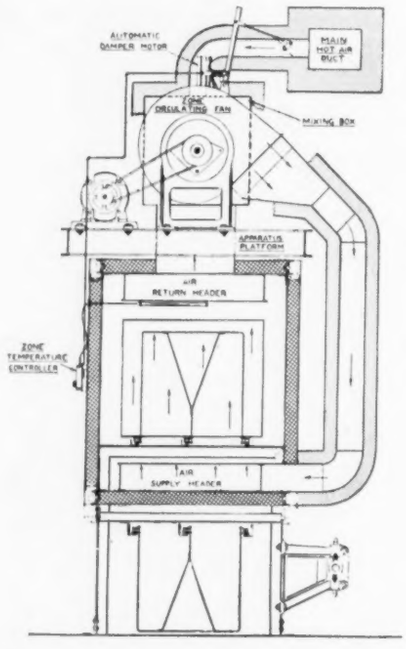


Fig. 4—Shown diagrammatically in this section through the oven is the means for conveying sheets through the oven, air circulating system and operation of the thermostatic control

A hood is provided over the first half of the cooling zone for collecting and discharging the heated air. A portion of the highest temperature air from the cooling zone may be recovered and recirculated back to the heating system.

Operation of the conveyor system is self evident, but the fuming zone, heating system, zone controls, and cooling section are unique and deserve mention. The heater supplies air at a constant controlled elevated temperature to the main header duct running to each of the oven zones, the number of zones used depending upon oven length. Temperature in this duct may be in the range of 600 to 700 degrees Fahr., which is greatly in excess of oven temperature, and is, therefore, not discharged directly into the oven, but is distributed under thermostatic control into each of the zone circulating systems.

Each Zone a Unit

Each zone is provided with a circulating fan, supply duct, return duct, mixing box, fresh air inlet, automatic damper and thermostatic control, as shown in the cross sectional view of the oven, Fig. 4. Air from the circulating fan passes into a supply duct the width of the oven and the length of the supply zone. From this plenum duct the air passes uniformly through a number of perforations and is blown uniformly between the sheets into a similar return duct. Consequently, every part of each sheet receives the same air treatment.

From the return duct the air is drawn into a mixing box on the fan inlet. Since the air in passing over the sheets in the oven is cooled somewhat, it must be reheated by mixing with it a small amount of the high temperature air from the main header duct. The amount of high temperature air introduced is controlled by the automatic damper operated by the zone thermostat.

Thus, any temperature condition can be independently maintained in each zone. If a greater volume of fresh air is required in any zone, this may be obtained through the fresh air louvres in the mixing box. Uniformity of temperature and uniformity of effect across the sheet is obtained by means of uniform air blow and zone temperature control. Control of oven atmosphere is accomplished through use of either direct or indirect heaters and by control of the volume of fresh air introduced. Further control is afforded through use of the fume removal system.

Excess air introduced at the various zones is caused to drift toward the load end by means of the exhaust

(*Please turn to Page 68*)

Fig. 1—General view of iron-plating plant in operation at Latrobe Electric Steel Co.

Bonding Ferrous Metals by Heat and Pressure

BY LEONARD C. GRIMSHAW

Superintendent, Duo Metals Division, Latrobe Electric Steel Co,. Latrobe, Pa.

THE idea of bonding two dissimilar ferrous metals, and making use of both, is an old one. Tips have been brazed onto tool shanks for many years. The bonding of larger pieces to form whole bars and sheets has also been accomplished, but has received little attention in technical literature, although a number of patents have been issued covering various methods for its accomplishment.

There are three main motives behind the manufacture of composite steels. One is that the physical properties of one steel may supplement those of another; a useful, but at the same time, hard, brittle steel may be backed by a soft ductile one, or a stainless steel may be backed by other steel possessing greater strength. Another motive is direct lowering of cost; an expensive steel may be backed by a less expensive one, bringing down the cost of the piece as a whole. The third motive is an indirect lowering of cost, as when a useful steel is backed by a steel that is easier to machine, so that machining cost on a finished product is lowered considerably. Often more than one of these motives lead to a decision to use a composite steel.

There are two methods in use that result in tolerably good bonds between ferrous metals: (1) the casting method, and (2) what we shall call the "heat-pressure" method. This "heat-pressure" method covers processes in which the bond is made between two prepared surfaces by heating them and then applying pressure. Usually sufficient pressure must be used to produce appreciable spread and elongation, or else we are merely brazing and not truly welding.

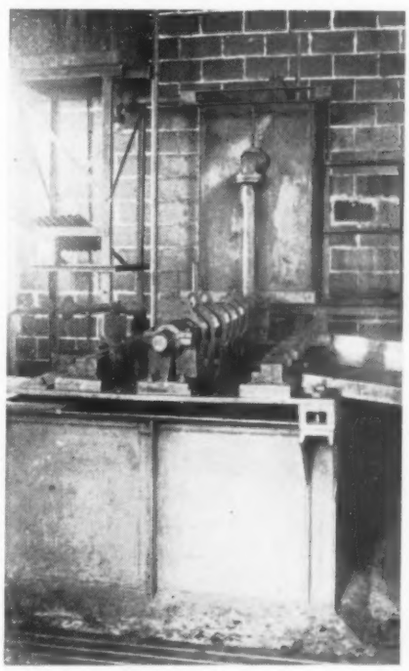
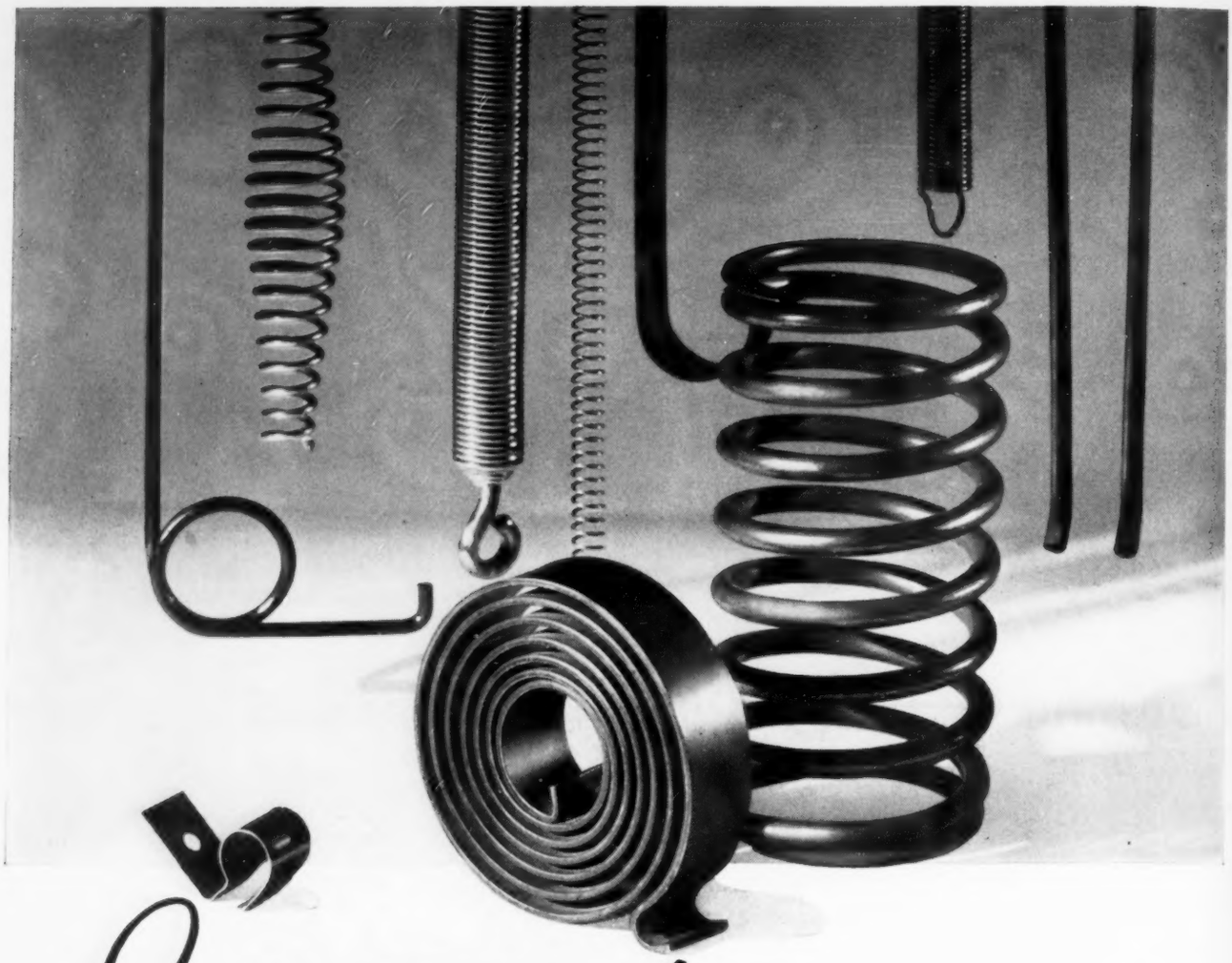


Fig. 2—Closeup of iron-plating tank, with filter and sump tanks in background. The tank extends some distance below the floor, being 8 feet deep

In 1931 announcements appeared in several magazines (STEEL, Aug. 20, 1931, p. 34; Sept. 17, p.36) of a method for the "heat-pressure" welding of ferrous metals, the product being named "Plykrome," or "Su Veneer." No details of its manufacture were published. For details of heat-pressure methods of welding we must turn to the various patents. Summaries of the principal patents were given in a recent discussion by Raymond R. Rogers (STEEL, Feb. 10, p. 34) describing a new method developed by P. A. E. Armstrong, by which sheets, bars and shapes are welded together so that one metal really diffuses into the other. It is the purpose of this article to describe the commercial uses and applications of this new heat-pressure method of welding.

In attempts to produce metals welded together, whether by casting or by the application of heat and pressure, the finished product has not been perfect. Usually nonmetallic inclusions, or the introduction of a soft weak metal between the two metals it is intended to weld, prevent the formation of a strong bond. Physical distortion, or heat treatment when the metals have

From a paper presented Feb. 19 before the Iron and Steel division of the American Institute of Mining and Metallurgical Engineers, meeting in New York.



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different coefficients of expansion, usually result in rupture of the bond. For certain uses such bonds have proved commercially acceptable, but there is a much wider field open to metals really welded and diffused together so that the weld is as strong as the metals themselves.

Iron can be welded to iron, despite oxide or scale, by heating to a good red heat and applying pressure. The weld relies upon the fact that the pressure will elongate the two pieces of iron, breaking up the scale into small islands. The bond takes place between the areas of oxide-free iron surrounding these oxide islands.

Prevents Complete Bonding

Upon exposure to the atmosphere many alloy steels form an invisible film of what is probably oxide, but which behaves differently from the heat oxide, or scale, upon ordinary iron. Whether this invisible film is a true oxide or not is not of immediate concern, but it will hereafter be referred to as an oxide film, because much reliable recent research supports this view. This invisible oxide film on alloy steels completely prevents any real bond from taking place when heat-pressure welding is attempted. Even visibly clean pieces of alloy steel, protected during heating from all scale formation, are prevented from welding under pressure by the action of this invisible oxide.

In the Armstrong method, the alloy steel is first given an electrolytic coating of pure iron. If the electrolytic iron is properly deposited upon the alloy steel, it will bond there, by diffusion, upon the application of heat alone. This pure electrolytic iron, with the alloy steel behind it, can then be welded easily by heat and pressure to any other piece of iron, or to another piece of alloy steel that has been given a similar coating of electrolytic iron.

Fig. 4—General view of large vise used in assembling composite billets

The iron-plating plant at Latrobe has been in commercial use for nearly a year. It includes tanks for cleaning, pickling, plating, washing, etc., and equipment for assembling the plated steel into composite billets ready for forging and rolling. General views of the plant are shown in Figs. 1 and 2. The tanks are 8 feet deep (going below floor level), 7 feet long, and 5 feet wide, so that fairly large billets and slabs can be handled. Fig. 3 is a sketch of the tank used for plating, showing the position of the iron plates used for anodes, and the manner in which the work is suspended by hooks from the cathode bar. Small pieces to be plated are held in specially constructed racks (not shown), which likewise are suspended from the cathode bar.

All tanks and piping holding corrosive liquids are made of iron lined with hard rubber, and the circulating pump and valves on the plating tank are made of durochlor. In the pickling tanks, the center bar from which the work is suspended is made the anode; in the plating and cleaning tanks it is the cathode. Direct current is supplied at between 4 and 6 volts. The plant is capable of handling between 6000 and 9000 pounds of billets of average size every eight hours.

Details of the Process

A step by step description of the operations performed on a single billet of alloy steel as it goes through the plating process will give a good idea of just how the work is handled in the plating plant.

The faces of the billet that are to make contact for subsequent heat-pressure welding should be reasonably flat. Scale will be removed during the electrolytic pickling, but time is saved by sand-blasting forged billets of high-speed steel containing cobalt, since this scale is exceptionally difficult to remove by pickling, and the billet will invariably become pitted before all the scale is removed. Electrolytic pickling removes scale with ease from all other steels.

First the billet is cleansed of all grease by making it cathodic for a few minutes, at a low current density, in a tank of dilute sodium hydroxide that is heated to over 120 degrees Fahr. It is then transferred to a pickling tank of 8N hydrochloric acid, where it is made anodic for about 15 minutes at a current density of about 100 amperes per square foot. This length of time is sufficient to remove the scale from almost any billet except the high-speed steels containing cobalt.

This strong hydrochloric acid

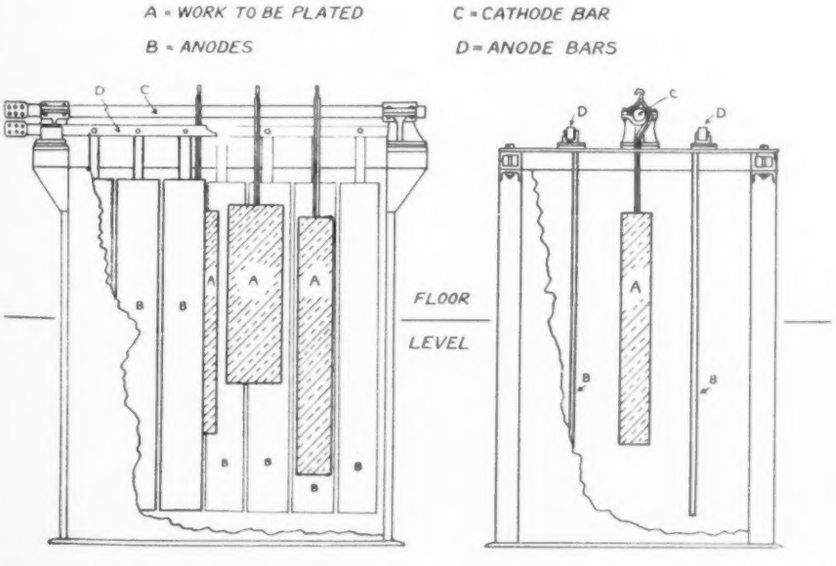


Fig. 3—Diagrammatic sketch of plating tanks, showing various elements in the installation

bath, operated electrolytically, seems to have a long life. Whereas such a bath used without the electric current would soon have built up an iron concentration high enough to render it useless for commercial pickling, the bath works electrolytically over long periods of time. Since this tank is lined with hard rubber, iron plates are suspended in the acid as cathodes. These plates are seldom removed; the iron content of the acid is so high that the plates dissolve slowly.

After this 15-minute anodic pickle the billet is removed, and washed and scrubbed free from sludge. All steels except those containing more than 3 per cent tungsten are now visibly cleaned and "shiny bright," but after exposure to the air during scrubbing are covered with an invisible oxide film, which is removed by a dip for 30 seconds in the hydrochloric acid solution. The billet, *while wet with the acid*, is immediately transferred to the plating bath and made cathodic.

Handling Tungsten Steels

Steels containing more than 3 per cent tungsten are covered with a black deposit (probably tungstides), which cannot be scrubbed off after the anodic pickle in hydrochloric acid. After scrubbing, a tungsten steel billet is further cleaned by treatment in a bath of 115 grams per liter sodium hydroxide, and 15 grams per liter citric acid, in which the billet is made anodic for 15 minutes at a current density of 25 amperes per square foot. Following this, a 30-second dip in the hydrochloric acid bath prepares the steel for electroplating, and it is transferred, *wet with acid*, to the iron-plating bath.

The iron-plating bath used is a Fisher-Langbein solution: 4N ferrous chloride, 6N calcium chloride, and N/100 free hydrochloric acid. The bath is operated at a temperature higher than 180 degrees Fahr., the solution being circulated and completely filtered during every 20 minutes. The work is made cathodic, and plated at a current density of 100 amperes per square foot or more. One hour's plating at 100 amperes per square foot gives a deposit of iron 0.006-inch thick, which is sufficient for most alloy steels. The resulting plate is soft, ductile, smooth, and will not chip or spall off.

The billet is next washed and dried quickly, so as to be free from rust. It is now ready to be assembled into a composite billet.

Iron will weld to iron by heat pressure, but here there is only a thin electrolytically deposited layer of iron, free from rust, and unless precautions are taken it will all scale away while the billet is being brought up to forging temperature. It is also advisable to obtain a weld entirely free from oxide—free, that is to say, from little islands of scale oxide—because wherever this oxide exists there will be no weld.

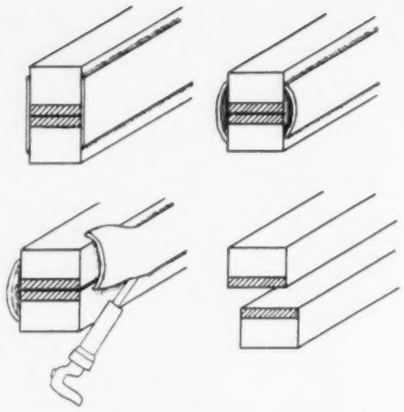


Fig. 5—Two-high composite assembly, shaded portions of the cross section being high-speed steel. Separating material is placed between the two pieces

The two or more pieces that go to make up a composite billet are assembled in various ways, depending upon the position and amount of the alloy steel required in the finished product, but each component piece is pressed firmly against its neighbor in a vise provided with powerful jacks (see Fig. 4) and then welded together by electric arc. It must here be stressed that this electric arc welding has no part in the heat-pressure welding to take place in the composite billet, other than to hold the pieces together and prevent scaling away of the electrolytic iron while the composite billet is being heated for forging or rolling. The electric arc weld always will be ground away before finish rolling, except on plates from which trimming of the finished product will remove it.

Precautions with High-Speed Steel

Stainless steels can be assembled easily by electric arc welding into any form of composite billet, but high-speed steels offer a few difficulties. Being air-hardening, precautions must be taken to prevent cracking of the high-speed steel alongside the electric arc weld. On larger pieces this trouble can be overcome most readily by using double (or two-high) assemblies, so that no electric arc welding need be done on the high-speed steel itself. Fig. 5 shows such an assembly, strapped together at the sides with strip 3/16-inch thick, with separating material between the two pieces of high-speed steel. This composite billet is heat-pressure welded, then the straps are chipped off with a pneumatic chisel (for they do not weld to the assembly) and the whole next separated into two halves. Separation into halves is easy because of the separating material put between the two pieces of high-speed steel. If precautions could conveniently be taken to plate only one face of each piece of high-speed steel, no separating material would be necessary. It is optional whether we use one of the special stop-off lacquers that are on the market, to prevent deposition of iron, or plate the whole piece and then use a separating material in order to prevent welding in this assembly, but the writer favors the use of a separating material because it is less expensive.

An electrolytic iron coating 0.006-inch thick, when protected against scaling during heating by electric arc welding of the composite billet, is sufficient for most alloy steels, but has to be twice as thick on high-speed steels containing cobalt. These steels possess such great powers of diffusion into the electrolytic iron that while the billet is being brought up to forging temperature the tungsten and cobalt in the steel will diffuse entirely through an electrolytic iron coating 0.006-inch thick, and unless the coating is thicker, by the time the billet is ready to forge we would be attempting to weld by heat and pressure not iron to iron but iron to a tungsten-cobalt alloy of iron, which cannot be done.

Must Overcome Warping

Forging or rolling of the composite billet produces a perfect weld. The temperature used is that demanded by the steel in the assembly that requires the highest temperature for good hot-working qualities. Warping and twisting of the composite billet due to unequal coefficients of expansion are always encountered once the perfect weld has been made, and must be overcome either by using double assemblies such as shown in Fig. 5, or by the use of special guides. Where there is a great difference in hot-work ductility between the components, special rolls and guides must be made to guard against flow of the more ductile metal around the less ductile one.

Sheets rolled on a plate mill are free from both these troubles if the sheets are assembled and rolled two-high. Normal trimming of the sheet removes all material that may flow up around the edges.

It is worthy of notice that where a perfect weld is produced a steel such as high-speed steel will elongate during rolling almost as much as the softer backing material. The roll pressure on the bar as it passes through the rolls is vertically downward, and if the weld is perfect, so that there can be no slip, the two kinds of steel must elongate together. Sidewise spread of the softer steel is a different problem, and is overcome only by special grooves in the rolls.

In the plating of stainless steel,

precautions should be taken to prevent iron from plating on the face of the stainless that is to become the useful surface of the finished product, because although nearly all the electrolytic iron will scale off during heating and rolling, the smallest particles remaining would impair the stainless properties. Also, diffusion of chromium into the electrolytic iron would reduce the chromium content of the surface. Grinding of the finished bar would remove these causes of trouble, of course. A good grade of black paint, chosen because it contains nothing that will harm the plating solution, will withstand the pickling and the hot plating solution sufficiently well to prevent the iron from adhering to the stainless steel. Paint and deposited iron can all be removed afterward by light scrubbing, as it tends to peel off.

Sheets or plates clad with stainless steel have been rolled successfully from "two-high" composite slab assemblies, which leave the stainless free to move independently of the backing slabs during heating for rolling. By this means trouble due to the differences of expansion between the facing and backing materials before the weld is made by rolling is overcome. When attempted as a single-high job, the greater coefficient of expansion of the stainless steel causes it to tear loose the electric arc welds that hold it to the slab of backing steel while it is being heated for rolling.

In making one of these special two-high composite slab assemblies, two stainless plates are separated by a mixture of aluminum oxide and silicate of soda, applied as a paste and then dehydrated. This mixture prevents the plates from welding or sticking together. They are electric arc welded entirely around their edges, so that they form a single watertight piece. In this form they are pickled and given a plating of electrolytic iron, then sandwiched between two slabs of backing steel cleaned by sandblast. These backing slabs are longer and wider than the stainless by several inches, depending upon the size of the assembly. With the stainless centrally located in the sandwich, the surrounding gap between the backing slabs is filled in and electric arc welded in such a way that the stainless has room to expand freely inside, while being protected from oxidation during heating for rolling. After rolling, the edges are trimmed off, and the separating material between the two pieces of stainless allows the two finished composite sheets to be pulled apart.

Finished composite sheets or plates prepared by this method may be of any thickness the plate mill can roll. Great reduction is not necessary to produce this weld; a good heat and a little reduction and the weld is made. Later heating strengthens the weld by diffusion. There is a wide field open for clad plates that are 2 inches thick, or more, as it is clearly in such heavy sections that important savings in cost of material are made.

Diffusion in Weld

The welds produced by this method are free from oxide inclusions, and show remarkable diffusion if the steel is reheated for forging, annealed, hardened, or otherwise raised to a bright red heat after the weld has once been made. The mention of heat treatment after welding brings to mind that in choosing the components of a composite bar any heat treatment that the finished bar may receive must be borne in mind. If one component is high-speed steel, for instance, the other component must be chosen to withstand the hardening temperature of high-speed steel. We have found two steels, one a medium-carbon manganese-molybdenum and the other a medium-carbon chromium-tungsten-vanadium steel, which are tough and undamaged after being given the hardening and drawing treatment of high-speed steels. Tools made of such composite pieces are much tougher than hardened high-speed steel, will withstand considerable shock, and can be bent appreciably before they will break.

Stainless sheets clad with ordinary 18-8 present the same difficulty as the high-speed steel, in that the backing material is not left in good physical condition after the clad sheet has been heated 2100 degrees Fahr. for the purpose of annealing the 18-8. However, there are 18-8 materials which do not require such high temperatures: 18-8 containing high manganese and copper, known as Armstrong metal, need be annealed at only 1250 degrees Fahr.; columbium-bearing 18-8 need be annealed at only 1700 to 1750 degrees Fahr.; and none of these treatments impairs the physical properties of the backing steel.

In all clad products where there is a great difference of expansion between the two steels used, if the weld is not excellent heat treatment will cause the sheet to burst or tear apart, often with explosive violence. All 18-8 clad sheets are of this kind and titanium-bearing 18-8 is particularly difficult to weld. The differences in expansion cause warping in all 18-8 sheets, but repeated heatings do not cause the weld to fail when made by the Armstrong process, and straightening does no damage.

There are three important features of finished welds made by this method:

1. The weld zone is free from nonmetallic matter.

2. The weld zone can be heat treated in the same way as an alloy steel.

3. The weld zone is strong and tough—a graduated alloy steel from the facing metal on the one side to the backing metal on the other side.

Physical proof that there is no pure electrolytic iron remaining in the annealed weld is not lacking. Fig. 6 shows an annealed sample of high-speed steel welded between two pieces of steel containing 0.15 per cent carbon and 5 per cent chromium. This has been fractured by slow, steady pressure, and has broken through the high-speed steel, which would be stronger than a pure

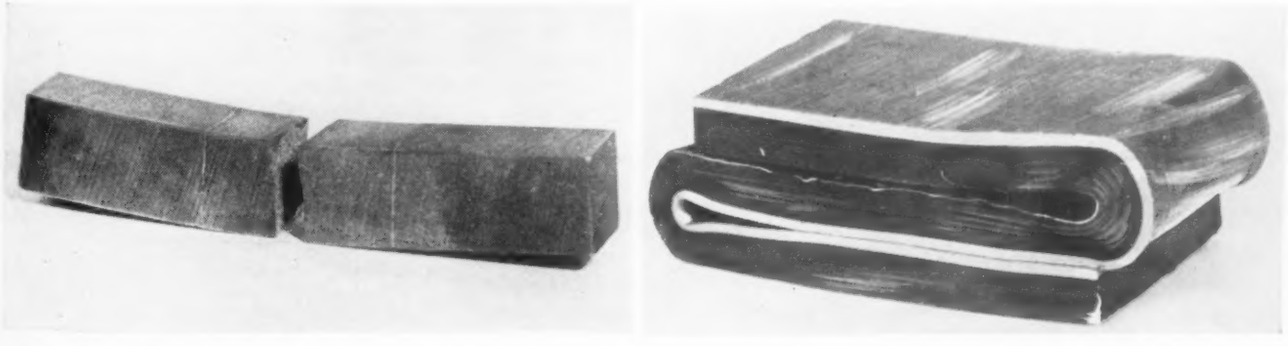


Fig. 6 (left)—High-speed steel duo-welded between 4 and 6 per cent chromium steel, fractured through the high-speed steel, welds remaining intact. Fig. 7 (right)—Cold bend test on iron clad with 18-8 chrome-nickel steel, showing no weld rupture

electrolytic iron if it were present in the weld.

A piece of iron clad with 18-8 is shown in Fig. 7, bent back twice upon itself under compression while cold, one bend having the 18-8 cladding on the outside, and the other one on the inside. There is no weld rupture. Repeated heatings and quenchings of this 18-8 clad material do not cause the two metals to part.

This method of welding is applicable to many nonferrous metals, and alloys such as Stellite and Hastelloy, which by its use have been successfully welded to iron backing material. Tungsten carbide and tantalum carbide have so far defied all efforts to pickle them clean enough for iron plating, but further work is planned on this problem.

There is no reason why any metal upon which a truly adherent iron plating can be deposited should not weld to another prepared piece, provided only that such a material would not melt at the welding temperature. Examples of two metals that it would be useless to plate with iron in this process are zinc and lead, as they would be molten at the temperature at which iron welds to iron, but copper can be successfully iron-plated and then welded. A flash coating of copper to receive the iron plating might be useful on an alloy steel if prevention of carbon migration across the weld is desired.

WHEN asked by the editors of STEEL for a statement concerning his process of cladding steel by the heat-pressure method, P. A. E. Armstrong, Westport, Conn., had the following to say:

"I have been interested in the cladding of alloy steels upon a soft backing steel for a good many years, as my patents on this subject will show. I have used clad products intermittently since about 1908 and have followed the development continuously.

"Clad products, of course, are not new, but have always been accompanied by weak welds, and in these days of high-alloy steels it has been practically impossible to make a weld that is strong, because of the rapid formation of a thin layer of oxide on the surfaces to be welded. . . . . In the process just described there is no nonmetallic matter or oxide in the weld zone.

Tank Plates Faced

"Recently we made up a fair tonnage of plates which will be turned into tanks. The backing was mild steel and the facing 28 per cent chromium steel. It has been contended that it is impossible to weld 28 per cent chromium to a backing plate. In fact, Latrobe Electric Steel Co. was the only company which quoted on the material. The plates have been rolled and are now being fabricated. The welds are successful and have withstood many types of bending tests; microscopic examination of the weld shows no oxide and the weld appears to be highly diffused alloy iron . . . .

"By this process it is possible to weld together any two ferrous metals, or nickel, any of the nickel alloys or nickel-silicon-molybdenum alloys, Stellite, or, in fact, any metal that has a melting point, or, perhaps a better way of stating it, a safe rolling point which is higher than 1750 degrees Fahr., which temperature seems to be the ready welding point of electrolytic iron. Of course, it will weld at higher temperatures than this.

"Essentially, this process involves the coating of an alloy steel with iron so that it will weld to an iron backing. My issued patent covers broadly the art of putting metals together by the use of electrolytic iron plated upon a surface free from oxide, and I have submitted applications which are based upon the procedure. . . . .

Holds Costs Reasonable

"The process is inexpensive. The actual cost of welding by heat and pressure is not excessive. High heats are not required and soaking is not necessary. The cost of electroplating with iron likewise is inexpensive. However, no matter what process is used, it is more costly to roll composite materials than to roll solid materials, and there would be no saving at all in the manufacture of composite materials if it were not for the fact that the backing material is always much less expensive than the alloy facing material.

"In tool steel, there is appreciable saving in machining costs. For instance, in a blanking die, all the backing portion is relieved and the impression is cut in the hard face. Normally the relief has to be done in the hard steel just as much as in the formed portion. By using composite steel, the relieved portions which carry the load are preformed in soft steel and the impression, which is the part actually used for cutting, is made in the hard steel. It does not pay to use small pieces of composite steel, but for large sizes, appreciable saving can be accomplished."

Stylist's Conception of Electric Range

REDESIGNING has improved both the appearance and efficiency of the Hotpoint electric range built by the Edison General Electric Appliance Co., Chicago. The new range has an inner steel body which is completely welded. The new model, in modern design, is more compact than earlier models, yet has equal cooking capacity. Heating efficiency of the new model has been improved by the use of heating units having an average life of more than seven years, against two to two and one-half years for the old old open units.

This model has a full porcelain enamel finish, with acid-resisting enamel used on the work surfaces. Outside enameled parts are used as trim only and are not required to give strength to the assembly. Mrs. Helen Hughes Dulany, Chicago, commercial designer, created this model

A.I.M.E. Meeting Has Largest Attendance of Recent Years

A WELL-ROUNDED program, reflecting advancement in the industrial sciences and metallurgy, attracted the largest attendance in several years to the 145th annual meeting of the American Institute of Mining and Metallurgical Engineers in New York, Feb. 17-21. Members and guests totaled more than 1700. Those in the steel and metalworking fields found a wide variety of subjects on the program, and of particular interest the joint symposium of the iron and steel and institute of metals divisions on modern use of metals in transportation.

John M. Lovejoy, president Seaboard Oil Co., New York, was elected president of the institute to succeed Dr. Henry A. Buehler, state geologist and director, Missouri bureau of geology and mines, Rolla, Mo. Newly elected vice presidents are Roland C. Allen, vice president, Oglebay, Norton & Co., Cleveland; Wilfred Sykes, assistant to president, Inland Steel Co., Chicago; and Henry Krum, consulting mining engineer, Salt Lake City.

New directors were named as follows: Eli T. Conner, coal mining engineer, Scranton, Pa.; John L. Christie, metallurgist, Bridgeport, Conn.; Selwyn G. Blaylock, vice president, Consolidated Mining & Smelting Co., Trail, British Columbia; Frank L. Sizer, mining engineer, San Francisco; William B. Heroy, oil geologist, New York; and Erskine Ramsay, chairman of board, Alabama Byproducts Corp., Birmingham, Ala.

THE Howe lecture, given by H. F. Moore, research professor of engineering materials, University of Illinois, Urbana, Ill., on the subject of "Correlation of Metallography and Mechanical Tests of Metals," also was a feature.

Discussing first the need of correlation, Prof. Moore briefly treated the underlying theory of mechanical testing and that of metallography, fixing the limitations of each. Emphasis in mechanical testing was placed on quantitative results, suitable as bases for specifications, whereas in metallography the emphasis was on qualitative results.

Fields in which correlative studies seem highly desirable include, he said: The mechanism of creep and of fracture in metals. The question as to when a fatigue crack starts is still unanswered. The problem of the mechanism of aging in metals, of the resisting strength of the grain boundaries compared with the intracrystalline metal, and of the damaging effect of internal strains in metals, compared with that of strains or stresses caused by external loads and moments are problems on which much more light is needed and which will require correlation of metallographic and mechanical tests, Prof. Moore stated.

In the institute of metals division annual lecture, Dr. Robert F. Mehl, director, metals research laboratory, Carnegie Institute of Technology, Pittsburgh, stated diffusion in solid metals constitutes one of the important fundamental phenomena in metallurgical behavior. Apart from its importance in such processes as chromizing, carburizing, nitriding and calorizing, diffusion plays an important part in the homogenization, age-hardening and transformation of steel. The scientific importance of diffusion is no less great, he added.

F. H. Crockard

Who is recipient of the 1936 J. E. Johnson Jr. award of the American Institute of Mining and Metallurgical Engineers, as announced in STEEL for Feb. 17. Mr. Crockard is metallurgist, Republic Steel Corp., Thomas, Ala.

Diffusion may occur within a grain of metal, along a grain boundary, or upon a surface, though the exact and even the relative value of these separate processes are known for only a very few cases, the speaker declared.

"Some distortion accompanies diffusion, leading to little understood grain-size changes," Dr. Mehl added. "Distortion assists diffusion though usually it disappears before diffusion has become extensive. In a binary system, the rate of diffusion is the more rapid in the lower melting metal. Age-hardening data on metals may be treated as diffusion data and rates of reaction in steel could profitably be studied from this point of view."

SPECIAL interest focused on a paper, "Carbon in Pig Iron," by William E. Brewster, superintendent of blast furnaces, Wisconsin Steel Works, International Harvester Co., Chicago. It was presented as "a study of increased carbon content in pig iron as related to blast furnace efficiency with respect to carbon consumption," and contained exhaustive data, which, according to many listeners, will be subject to widespread discussion for considerable time to come.

The author declared that much more work was to be done in further substantiating the ideas and data contained, adding that the conclusions were presented at this time in hope that they would stimulate constructive criticism and further work which "(may defintely change the present-day conception that nothing can be done in blast furnace practice to control carbon content in pig iron."

No Data Were Available

Prefacing his remarks, Mr. Brewster said that some five years ago various foundries had made inquiries of his company as to the probable total carbon content in a given specification in grade of pig iron. Up to that time they had no data, he said, save for a few occasional exceptions, no attempt had been made to set up routine determinations of total carbon. In fact, at that time, he remarked, a cast analysis was considered sufficient, without examining at further length into possible variations of analysis between ladles of the same cast.

It was then that his company first began to accumulate data. They sampled all piles of all grades of pig iron, basic excepted, makng complete analyses. Finding some variation in carbon content, more samples were obtained and the carbon content with respect to silicon was plotted in each grade of iron except for the higher phosphorus foundry iron, where it was necessary to divide the group into 20-point phosphorus ranges. He described the method pursued, stating that by means of graphs prepared it was possible to answer in-

quiries as to total carbon content of a given grade fairly satisfactorily.

Then about a year ago Wisconsin Steel Co. blew in a remodeled furnace, a stack equipped with modern hot blast stoves with ample capacity for high heats, automatic hot gas control, automatically controlled filling, and a rotary double-screw type mud gun, capable of stopping the iron notch with no slackening of blast whatsoever, thus making for continuous operation in blast. They then resumed study of the carbon content in iron so as to bring the iron produced in the new furnace into their calculations. They were prompted, Mr. Brewster said, to do this primarily, because of an apparently higher temperature of the iron tapped.

After obtaining a large number of determinations, 916 in all, the information was plotted. These curves were compared with the curves previously derived from iron of the other furnaces, and it was found that the iron made in the new furnace exhibited a trend of 0.10 to 0.25 points higher total carbon than had been the case theretofore.

The speaker described various comparisons and data compiled, pointing out that his company had been confronted with the problem of reconciling higher total carbon content in pig iron produced in the new furnace, as compared with previous determinations on the other furnaces, using the same coke, limestone and ores. There were but two outstanding differences between the operation of the new furnace and the others; namely, higher blast heats and more continuous application of blast.

Reasons Are Not Apparent

In one chart he showed that a variation in blast temperature alone, from 1100 to 1500 degrees Fahr., fails to influence the total carbon content. He indicated that the new furnace was consistent in gasifying less carbon at the tuyeres than was necessary for the indirect reduction of Fe from Fe_2O_3 in the charge. Mr. Brewster concluded that direct reduction is necessary at all times in the new furnace to reduce that portion of Fe from Fe_2O_3 not reduced by indirect reduction. Direct reduction, he said, requires approximately 1120 B.t.u. per pound of Fe reduced, compared to a production of approximately 1540 B.t.u. per pound of Fe reduced by indirect method. The deficiency of heat in the case of direct reduction, he said, must be made up by additional heat in the blast, thus concentrating more heat in the hearth which should function toward the fixing of more carbon in the metal produced.

When the new curves were plotted against those previously derived prior to the blowing in of the new furnace, one graph, having to do with malleable, showed that both curves met at about 0.70 per cent silicon, and became more and more divergent as silicon content was increased. Mr. Brewster said they believed, that owing to the fact that such silicon is subnormal for ordinary malleable practice, the differences in foundry operation affecting the efficiency of the fuel consumption such as blast temperature and a possibly bad working furnace, do not exist.

In three other charts, pertaining to foundry iron and showing various phosphorus changes, the comparison

C. C. Henning

Who is recipient of the 1936 Robert W. Hunt award of the American Institute of Mining and Metallurgical Engineers, as announced in STEEL for Feb. 17. Mr. Henning is assistant general metallurgist, Jones & Laughlin Steel Corp., Pittsburgh

was not as uniform nor as regular as was the case with respect to the malleable iron. The speaker thought the explanation of this may lie in the fact that some phosphate rock was usually charged to obtain phosphorus content in foundry pig iron.

He said that phosphate rock is a tricky burden constituent. He added that heat is most important in determining the carbon content of pig iron and that therefore he believed the use of varying amounts of phosphate rock in the foundry mixture with a consequent variation in heat requirements was responsible for the non-uniformity of the foundry iron carbon curves.

Working on the theory that higher blast heats might bear a definite relation to total carbon content, Mr. Brewster constructed four curves showing carbon content of malleable iron (phosphorus 0.101-0.190 per cent) each on a different heat range. He stated that schedules do not permit of silicon analyses covering the entire scale in each range so that they did not have a similarity in volume of determinations between silicon percentages in each heat range.

In another chart, curves of each 100 degree heat range were superimposed to see what evidence, if any, could be detected to show that higher blast heats influenced the carbon content, but they were unable to detect any. This refuted any theory that the higher carbon content of the new furnace was due to higher blast heats. After deriving all of these curves they were unable, therefore, to throw any more light upon the reasons for the higher carbon content of the iron from this furnace.

IN A discussion on the porosity, reducibility and size of preparation of iron ores, T. L. Joseph, supervising engineer, iron and steel section, metallurgical division, United States bureau of mines, Minneapolis, drew conclusions based on extensive experimentation. His tests, he stated have shown that judicious crushing of dense iron ores to a size that will permit more complete reduction in the upper shaft of the blast furnace has resulted in substantial savings in fuel. Fuel requirements per ton of iron on furnaces operating on reduced air blast also have shown clearly the desirability of more complete reduction and preparation of the charge in the upper part of the furnace, he said.

Specimens of iron ores varying widely in porosity were reduced with hydrogen under a set of prescribed conditions, he pointed out in his summary. The reducibility, expressed as the reciprocal of the time required for 90 per cent reduction, varied directly with the porosity. The relation developed indicated the degree of crushing for ores within certain ranges of porosity.

In his remarks on the reducibility of iron ores, he described the types of the ores investigated and commented on their physical properties, and went into considerable detail as to the tests. He then discussed the relation between porosity and relative reducibility of ores, the relation between the rate of water formation by hydrogen reduction and porosity of iron ore and the application of the relation between porosity and relative reducibility.

Commenting on the size and porosity of ore lumps for blast furnace use, he said that if large lumps of hard, dense ores are charged into blast furnaces, they will reach the top of the bosh and the fusion zone with unreduced centers. The size of such ores, he said, should be reduced according to the porosity, which has been shown to bear a direct relation to the time required for reduction.

Finer crushing, he added, has improved furnace practice on Alabama and Utah ores. He spoke, too, concerning the reducibility of altered and unaltered magnitites.

Mr. Joseph collaborated with W. F. Holbrook, assistant chemical engigineer, United States bureau of mines, Minneapolis, in a paper on the relative desulphurizing powers of blast-furnace slags. Mr. Joseph brought out that a laboratory method has been devised by which these relative desulphurizing powers may be determined. Data and diagrams were presented showing relative desulphurizing powers at 1500 degrees Cent. of all blast furnace slags containing 10 per cent or less MgO that are likely to occur. No simple relationship, it was said, was found by which chemical composition as designated by the term "basicity" could be compared with desulphurization.

It was shown that to relate basicity and desulphurization MgO cannot be combined with CaO as "total bases," nor can Al_2O_3 be combined with SiO_2 as "total acids." Moreover, Al_2O_4 cannot be ignored, it was said, in computing basicity, as is frequently done. Each oxide has its own effect on desulphurization, and the degree of the effect is not constant for all ranges of composition.

MgO, the authors continued, has been found to be slightly deleterious to desulphurization of acid slags. The effect become increasingly undesirable as basicity is increased to that of slags of average composition. The presence of MgO, however, it was pointed out, is decidedly favorable to sulphurization in the more basic slags.

It was suggested that the evolution of CO accompanying desulphurization has an important role in the overall process. It retards the descent of falling metal drops and carries CaS and globules of metal away from the bath interface and into the slag, in both instances contributing to the effectiveness of the reaction, it was said.

ACTION of solutions of sodium silicate and sodium hydroxide at 250 degrees Cent. on steel under stress was described by C. W. Schroeder, research engineer, and A. A. Berk, junior analytical chemist, respectivly, joint committee on feed water studies, attached to the nonmetallic minerals experiment station, United States bureau of mines, Rutgers university, New Brunswick, N. J.

The authors stated that at 250 degrees Cent. sodium hydroxide concentrates up to 25 or 50 grams per 100 grams of water do not produce any significant effect on the tensile load that steel specimens will sustain; also that additions of small amounts of sodium silicate to the sodium hydroxide greatly reduce the tensile load that can be carried.

It was also brought out that on specimens subject to both tension and bending with a line of stress concentration the load that could be carried at 250 degrees Cent. was reduced from 65,000 pounds per square inch to less than 20,000 pounds per square inch in sodium hydroxide-sodium silicate solutions.

It was also revealed that microscopic examination on the specimens that failed in the sodium hydroxide-sodium silicate solution indicates that one of the characteristic effects of the presence of the silicate was the production of a large number of fine, intercrystalline cracks in the metal near the fracture.

Failure to recognize the part played by sodium silicate in the embrittlement of steel and the use of sodium hydroxide solutions that contained from very little to relatively large amounts of sodium silicate has resulted in many conflicting data regarding this type of failure, it was said. With a knowledge of the action of the silica, it is now possible to correlate many of these data.

Considerable evidence, the authors asserted, is now available to show that the hydrogen released by the action of the solutions on the steel is a most important factor. It is difficult, however, to see the exact part played by silica in such a process.

Pure Iron Is Welded

The metallurgy of "pure" iron welds was discussed by Gilbert E. Doan, associate professor of metallurgy, Lehigh university, Bethlehem, Pa., and William C. Schulte, research metallurgist, Lukens Steel Co., Coatesville, Pa. They declared that the physical and micrographic constants of some high-purity iron arc welds have been obtained, but that metallurgical examination of the materials used in their investigation seems to throw no light on the nonarcing phenomenon observed in argon gas. Neither does it explain the absence of crater formation or "penetration" into the welded metal when welding is done in highly purified argon gas.

Substantial removal of solid elements from the iron takes place upon welding in argon as well as when welding is done in air. Hence, the authors declared, oxidation does not seem entirely responsible for this removal in ordinary welding. The gas content, both of iron and of steel, is high when welding is done in air. The coating used was only partly effective in excluding these gases.

It was also concluded that steel welds made in argon are porous even if the argon is almost pure. This porosity is accompanied by an evolution of carbon and oxygen from the weld metal, probably in the form of carbon monoxide gas. Coated-iron welds made in air show normal penetration with porosity usually present. The iron weld in argon have a very coarse grain size, while the same welds in air are rather fine grained, it is stated. It was also brought out that the yield strength and ultimate strength of iron welds made in argon (23,400 and 40,600) correspond with their purity.

The action of air in the absence of coating does not raise the strength of steel welds as much as it does that of iron, nor does it lower the plasticity of steel as much as it does of iron. It was further stated that with steel, the use of coating is accompanied by greater success than with iron. Iron welds in argon do not age-harden, but in air iron welds and also steel welds age-harden at room temperature.

Results of an international cooperative study of methods for the determination of oxygen in steel were presented by J. C. Thompson and H. C. Bacher, national bureau of standards, Washington.

Co-ordinated Design and Operation of Strip Mill

(*Concluded from Page* 37)

roll shop, a room 80 x 182 feet. In this room are installed a roll grinder and a roll lathe and adequate space is available for storing and assembling bearings and rolls. Twelve electric overhead traveling cranes of the latest type serve the various sections of this new plant, a 30 and a 60-ton unit running over the strip mill. Two 15-ton cranes handle coil storage, two more 15-ton units being used in the coiler building and a third set of two 15-ton cranes being installed in the finishing department. The motor room has a 30-ton crane, the slab yard is equipped with two 30-ton units, and a single 15-ton crane is provided in the roll shop.

Throughout the entire mill advantage has been taken of the latest advances in design and practice. Ample room has been provided in each section to allow for expansion and still leave sufficient storage and handling space to permit co-ordinated production and shipping. It represents months of intensive study in planning to provide for straight line operation, the elimination of bottle necks, and the co-ordination of equipment and facilities. Air, steam, water, oil and grease lines were studied as a whole. Electrical layouts were analyzed and co-ordinated, and every provision made for obtaining rapid and efficient operation and control with a minimum of manual labor.

Methods and Materials

Stage in Radio City Music Hall Is Operated by Hydraulic Elevators

FOUR stories below the street level in Radio City Music Hall, New York, is an intricate mass of machinery and pipe lines which constitutes the apparatus for control and operation of the hall's massive stage and orchestra platform.

Two hydraulic elevators raise and lower the orchestra platform while six rams are required to operate the three stage segments, each of which is 16 by 72 feet. These segments, viewed from below, are shown in the accompanying illustration. A single operator at a central control board can operate these segments separately or as one unit. Distances and speeds are pre-set and are regulated automatically.

Deck plate girders, 3½ feet thick, support the stage platforms, which can be raised 13 feet over the normal stage level at a speed of 45 feet per minute. The platforms have a total lift of 43 feet.

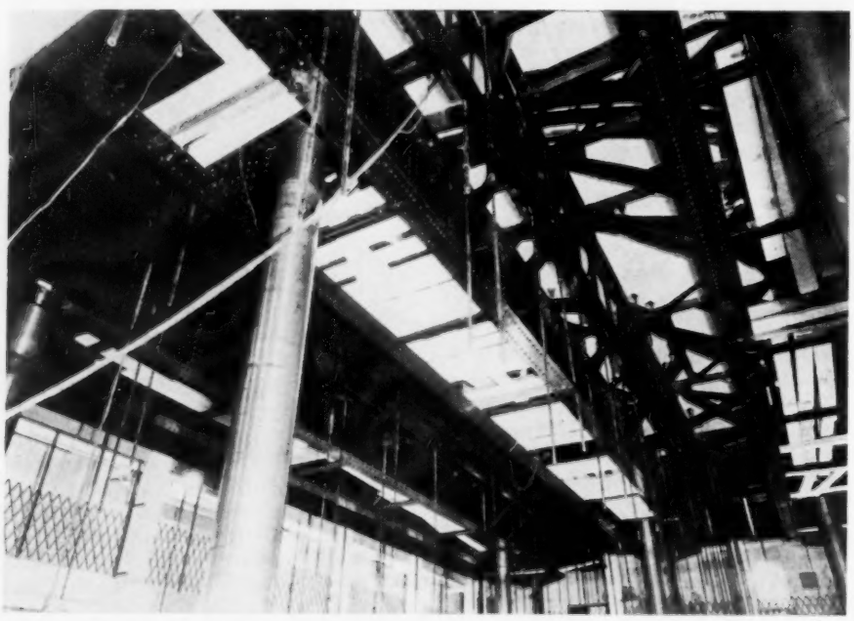
When it is desired to utilize the stage segments as a single unit, leveling valves keep the units in master control and automatically allow for leakage. These valves keep the segments to within ⅛-inch accuracy, even when the system is being severely jolted by ballet dancers.

An equalizing unit geared on tracks travels up and down with the elevators of the stage proper and maintains equal loads over each of the segments. The elevators thus counteract the shifting of weight caused by scenery or the grouping of actors.

Operated by an electric motor and set into the three segments of the stage floor is a 43-foot diameter turntable. The action of this turntable is entirely independent of the elevators and obviously can be used only when the segments are locked together by clutches.

The eight rams are 20 inches in diameter and are capable of lifting 255 tons. Water mixed with a soluable oil to prevent corrosion and pitting is used as the hydraulic fluid and is stored in two large tanks 7½ feet in diameter and 25 feet long. These tanks and 250-horsepower motors are four stories below street level while the valves and rams are installed three stories down.

The Baldwin-Southwark Corp., Philadelphia, in conjunction with Peter Clark Inc., New York, constructed these eight elevators which make possible the rapid and clever scenery effects and shifts in this famous theater.



The orchestra platform and stage of Radio City Music Hall are raised and lowered by eight hydraulic elevators, six of which are shown here. The stage is built in three segments, 16 feet wide and 72 feet long, which may be controlled separately or as one unit

$ $ $

Monel Metal Valves Resist Corrosion and Abrasion

Corrosion resistance is one of the most familiar reasons for the use of Monel metal. From Great Britain comes a report that emphasizes the ability of this metal to resist abrasion as well as corrosion. A British manufacturer uses Monel metal valves which are constantly exposed to a boiling mixture of acid and carborundum powder. These valves lasted about nine times longer than phosphor bronze valves previously used, it is said.

$ $ $

Stainless Bolt Withstands Unusually Severe Service

A stainless steel bolt used to fasten two bronze fittings in feeder No. 1, Sunnyside substation of the Ohio Power Co., and subjected to a severe sulphurous atmospheric condition, recently was removed after eight years of service and found to be in good condition. In this service, the ordinary steel bolt normally goes to pieces in a very short time. Installed in June, 1927, the bolt was

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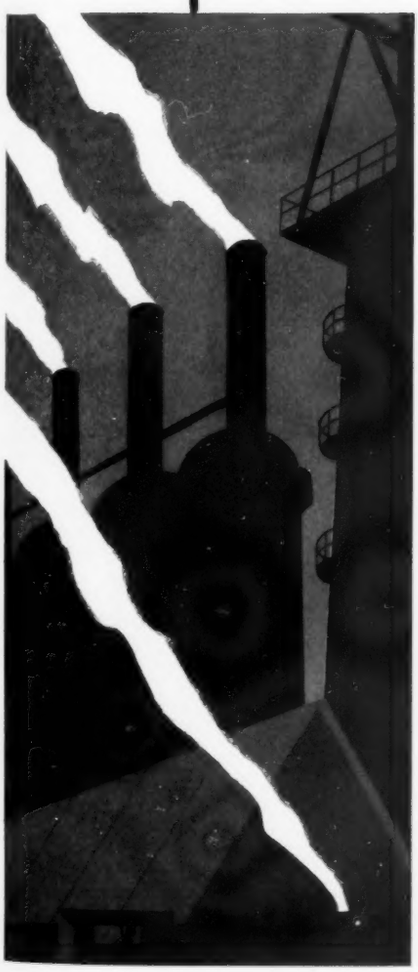

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removed from the fittings in September, 1935.

The bolt was a product of the Upson Nut division of Republic Steel Corp., Cleveland, and the material was Enduro stainless steel made by the company's alloy steel division, Massillon, O.

S S S

Coiled Steel Is Dried in Electrically Heated Oven

In producing steel in coil form, such as rod and wire, it is necessary to dip the products in a caustic solution to clean off the scale, grease and dirt. After the coils have been dipped, they must be dried thoroughly since the next operation is to dip them in a salt bath for heat treating. If the material is not completely dry, steam will be generated instantly in the salt bath and an explosion will result.

One large company has solved its drying requirements by building a large oven which is electrically heated. No special electrical equipment was required for the oven. Standard strip heaters, totaling 175 kilowatts, were mounted on the side walls, providing ample heat for rapid, through drying.

A large fan is mounted inside the oven to circulate the air and maintain a uniform temperature throughout the oven. To make loading rapid and easy, the oven is of the double-end door type.

Underframes of 70-Ton Gondola Cars Welded Without Altering Basic Design

BY JOHN E. TESSEYMAN
Bethlehem Steel Corp., Bethlehem, Pa.

THROUGH utilization of arc welding, a new method has been developed for the fabrication of railroad freight car underframes. The purpose behind this development was to provide greater rigidity of structure and reduction in weight without radically altering the basic design of the car.

Early last year, the Bethlehem Steel Corp., Bethlehem, Pa., used the new welded underframe in the design of 70-ton mill-type gondolas with solid bottoms, low fixed sides and drop ends, for the Lehigh Valley railroad. Out of a total of 250 cars built for this road at the Bethlehem company's Cambria plant, Johnstown, Pa., 135 were equipped with the improved welded underframes. Of this number, 125 cars were of conventional type and 10 were of the cushion underframe type, thus illustrating the adaptability of welded fabrication to either type in general use.

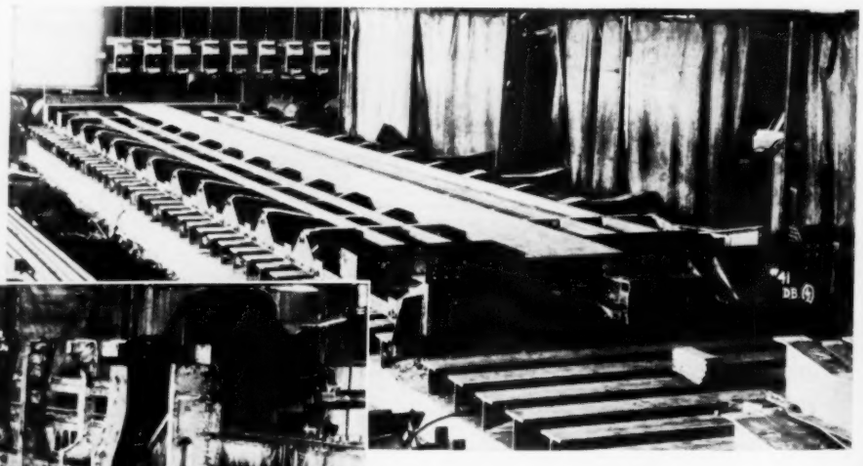
Much of the development work in determining the practicability of welded construction was carried on at the company's Bethlehem plant, but the final details incident to production were completed at the Cambria plant, since the latter is the center of activities for the building of freight cars.

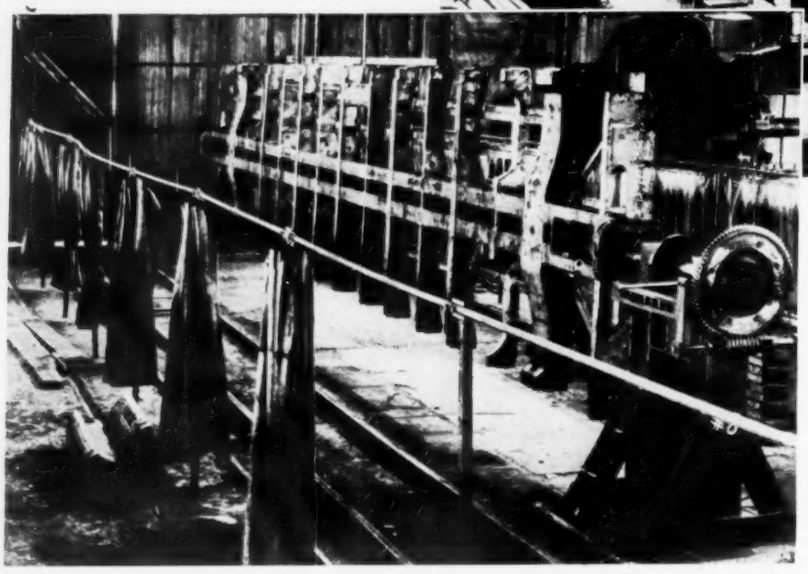
Prior to the building of the Lehigh Valley cars, welding was employed in the fabrication of underframes and pilot cars at the Bethlehem, Pa., plant, and of the various tests made on the finished structures the loading test showed less deflection for the welded type of underframe as compared with the riveted type. Other tests made on the welded members showed that the strength of the weld is equivalent to that of the parent metal.

Special Equipment Installed

To expedite the fabrication of these welded underframes, equipment was installed which, in general, includes a surface table 210 feet in length, made up from 8-inch I-beams laid parallel on a concrete foundation; necessary jigs; pantograph flame-cutting units, and special trunnions in which to suspend the underframe assembly during the finish welding operations.

In fabricating a welded underframe, the first operation consists of setting up some of the component parts on the surface table shown in one of the accompanying illustrations. This table, in itself, is a type of jig in which the center sill, striking castings, separa-





AN UNDERFRAME being assembled on the surface bed which also serves as a jig to hold component parts in place while they are being tack welded

•

UNDERFRAME in trunnions where all finish welding takes place. The underframe is turned, as required, to facilitate the welding operations

tors, and body-bolster center braces for this type of car are placed in position. Here these parts are merely tack welded in place after which the assembly is moved to the next bay where the horizontal surface welds are completed.

From this bay the assembly is moved to the next position for cambering and cover plating. After these parts are skip welded the assembly is then moved to its next position for fitting the necessary crossties, bolsters, and end sills to the center sill and tack-welding them in place. Before the assembly is moved from this bay all floor supports are also tack-welded in position.

Turned on Trunnions

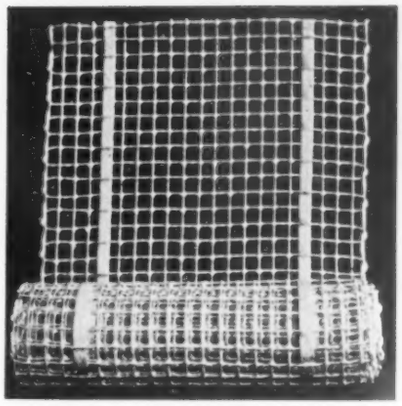
Up to this point all welding operations are confined to plain surfaces which are parallel to the surface table. To permit finish welding operations to be carried on in a horizontal plane, the underframe assembly is suspended between trunnions, whose shafts are extended into the openings of the coupler striker castings. This operation is shown in one of the illustrations. While in these trunnions, the underframe section is revolved by means of a hand-powered worm drive on one trunnion so that the welders may perform their work with the section to be welded brought to a horizontal position.

When this welded assembled section is removed from the trunnions, it is a completely welded underframe which is then taken to the erection shop for the completion of the car. The light weight of the completed car, 54,000 pounds, permits a load limit of 156,000 pounds, and when loaded to capacity the ratio of revenue load to total weight is 74.3 per cent.

Steel Wire Splint Has Advantages

GAUZE splint made from steel wire came into wide use in military hospitals during the World war and continues useful wherever splint is required. It finds applications in general medical and surgical work. It may be used by the novice in applying first-aid dressings and fills a real need in first-aid kits and in first-aid stations in industrial plants.

Such splint may be used for the temporary or permanent treatment of fractures and sprains. It may be applied as a protective covering following surgical operations. Used with or without plaster in the reinforcement of permanent dressings applied in tubercular and other diseases of the bones and joints, notably in diseases of the spine and hip, it multiplies greatly the strength of the cast; furthermore, its use makes it possible to employ less



Made of hardware cloth, this splint is easily folded to correct length and molded with the fingers to fit the injured part

plaster, thus lessening discomfort to the patient. Wire gauze splint also may be used in suspension, wound irrigation and where inspection of wounds is necessary.

The splint shown in the accompanying illustration, manufactured by the Wickwire Spencer Steel Co., 41 East Forty-second street, New York, is supplied in rolls which are packed in convenient cardboard cartridges with a label on which are printed complete instructions covering the use of the splint. Outstanding features of the splint include: Ease with which it can be folded to obtain correct length and the simplicity of molding it with the fingers to fit the shape of the injured part.

This splint is made of standard hardware cloth, four wires to the inch. The wire used is 23-gage and this is reinforced with fine-gage strip steel. Both wire and strip are of copper bearing steel which is low in sulphur and carbon. To make the splint pliable it is soft annealed. A hot dip galvanized finish is used. The 4-inch splint weighs 4 pounds per dozen cartridges while the 5¼-inch weighs 6 pounds.

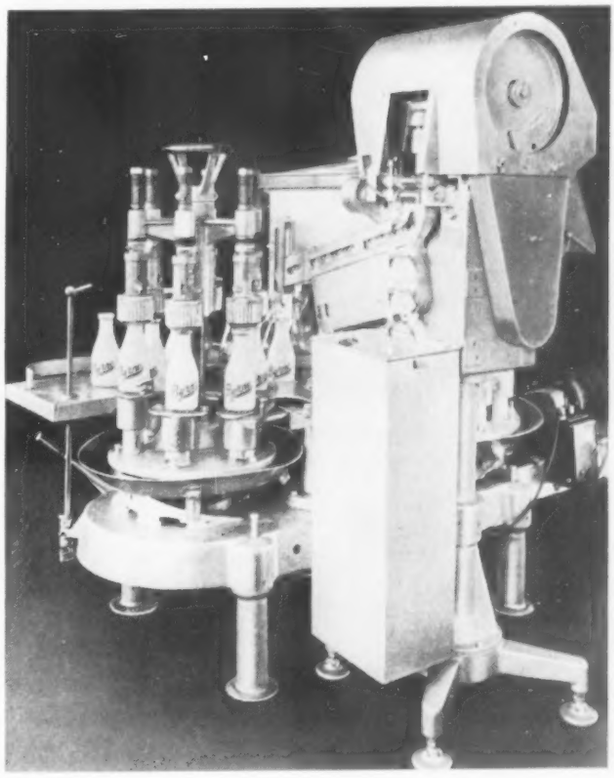
Machine Built to Resist Corrosion

MACHINES of the type shown in the accompanying illustrations have been developed by the Doyle Machine & Tool Corp., Syracuse, N. Y., for production of a new type of milk bottle cap perfected by the Sanitary Metal Cap Corp., Syracuse.

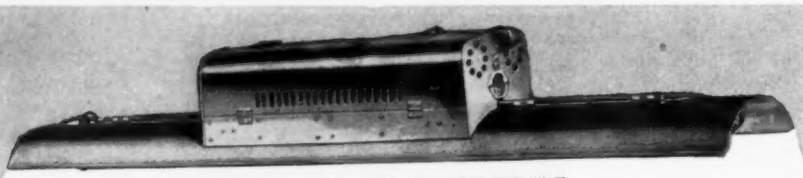
Made of aluminum foil, with a cupped top which fits the cap seat of the bottle and with a rumpled skirt which fits over the entire pouring roll of the bottle, this cap is applied to the bottle in one operation as compared to the usual double opration required in first applying a paper cap and then a paper cover fastened by wire or other means.

The cap is embossed with the name and trademark of the dairy or milk distributor and it may be had in any desired color finish. Cleanliness, attractive appearance and economy are claimed for it.

The machines which produce these



ALUMINUM seal forming machine, operating in conjunction with bottle filling and sealing units



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GENERAL ELECTRIC VAPOR LAMP COMPANY

682

COOPER-HEWITT MERCURY VAPOR LIGHT

caps are operated in dairies where they are kept clean by the use of hot water and steam. Edward N. Trump, treasurer, Sanitary Metal Cap Corp., who designed them, selected for their construction materials which will withstand such corrosive

New aluminum foil seal has cupped top which fits the milk bottle cap seat and has a rumpled skirt which fits over the entire pouring roll

attack. Dies for punching out the disks from which the caps are made, the rolls which feed the foil and other parts are of stainless steel. Mr. Trump for 50 years was chief engineer, vice president and general manager of the Solvay Process Co., Syracuse.

Outward Pressure Now Used To Hold Windows

Conventional type of inward pressure to support the glass in store show windows is reversed by a new principle in rustless metal window construction evolved by the Kawneer Co., Niles, Mich. In this new construction face member and gutter interlock, after the glass has been set, and a resilient spring inserted back of the glass. The spring exerts a continuous outward pressure, holding the glass against the face member. With the exception of the spring member, Kawneer store front construction is fabricated from heavy-gage extruded sections of solid aluminum or bronze. Fronts are available in polished or satin finishes, and alumilited aluminum.

Aluminum and bronze also are being used in the construction of factory-fabricated light-weight double hung windows for homes, and for medium-weight hung windows for schools and commercial buildings. Specifications laid down by the company for the medium sash include the use of specially formed stainless steel for the weather stripping members of the side jambs.

Welding, etc. . . .

by Robert E. Kinkead

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

Old Men

MOST of the age retirement schemes being discussed at present involve involuntary retirement based on age—and are therefore fundamentally unsound. The theory that a man over 60 cannot hatch a new idea is demonstrated to be false every day. In most cases, a man over 60, when he gets a new idea, does not do anything about it. It only seems that such men do not have new ideas. The most productive combination for getting things done is use of the experience and judgment of men who have had long years of experience but derive the driving force required for execution from younger men.

The smartest thing any company could do for the elders in its organization would be to build a luxurious club for them and hire them to be there every day at the service of the active young men who are carrying on the business. Hire the young men on a two-week contract basis with the understanding that they are to be right the first time in important decisions or their contracts are canceled.

There are a dozen leading companies in this country which do substantially what is suggested above. The important difference in the case of the Ford Motor Co. is that the club has only one member, and he is having too much fun at 70 to sit around any luxurious club.

Delivery may be obtained on any kind of a plant, machine or equipment that anyone knows how to build in 12 months. There is only one way you can get delivery on 40 years' experience in less than 40 years—get it from the man who has it.

Something To Think About

A STEEL producing company bought a large centrifugal pump for use with bad water. In a matter of about two years, the gray iron of the casing had deteriorated to the point where the pump had to be taken out of service to be repaired by brazing. Removing the corroded cast iron and machining were important items of expense. It would have cost much less for the pump builder to have applied the bronze in the process of manufacture to protect the pump casing from failure.

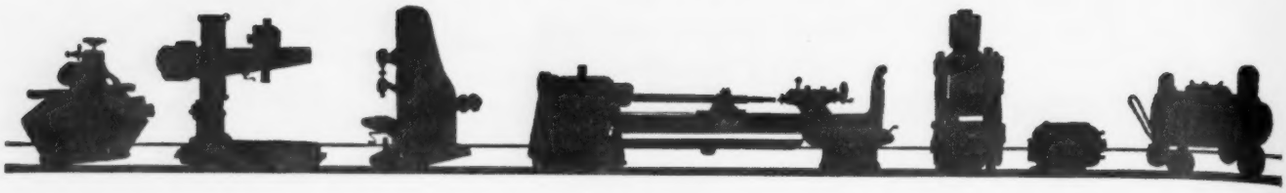
Railroads buy rails, use them until the ends batter down, at which time they are welded or hardened in track under traffic. It would cost less to harden the rail ends at the point of manufacture.

Locomotives wear and corrode at certain points. There are thousands of service records which establish precisely where these points are. Maintenance staffs weld metal on these points when they fail the first time, which gives a life of four or five times the life of the original metal. It would cost less to have the metal applied to the new locomotives before they are ever put into service.

Here is a field of opportunity for machinery and equipment manufacturers which does not require any particular genius to exploit, the welding knowledge involved is readily available, and the buyer of the equipment will be glad to accept the savings effected. The idea is perfectly safe and conservative enough because it was used long ago in the manufacture of watches (jewelled bearings and plated cases).

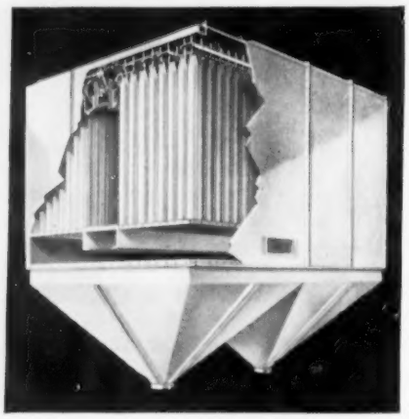
Increased use of welding is showing the expected results in central station electric generating capacity. The time is approaching when additional generating capacity will be required. A number of welding applications are in the project stage which will require from 1000 to 5000 kilovolt-ampere station capacity. Detroit Edison, one of the most progressive central stations in the world, foresaw the trend and expanded generating capacity just before the need was apparent to others.

New Equipment



Dust Collector—

American Foundry Equipment Co., 555 Byrkit street, Mishawaka, Ind., is offering a Dustube collector that is simple in design and operation. The



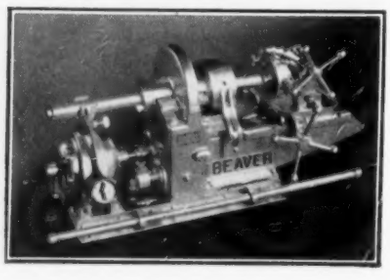
All tubes are easily accessible in the American Dustube collector

heart of the unit, shown herewith, is a long tube made of special woven fabric suited for filtering of ordinary dust. Spring suspension of the dust tubes maintain proper tension on the cloth. In this multiple tube design each one works independently. If a tube is damaged it can be easily unhooked, rolled up and placed in the inlet seal at the bottom, thus sealing the opening temporarily without interfering with operation.

♦ ♦ ♦

Pipe Machine—

Beaver Pipe Tools Inc., Warren, O., is marketing a model A pipe machine, shown herewith, that will cut, thread,



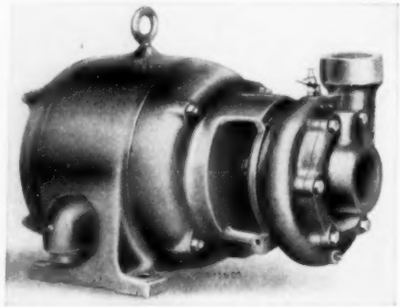
Beaver model A special pipe machine with ⅛ to 2-inch capacity

ream and chamfer all sizes of pipe ⅛ to 2-inch, operate geared tools to cut and thread 2½ to 12-inch pipe, cut off solid round bars or stayrods ¼ to 1-inch, and thread bolts and stayrods from ¼ to 2-inch. The unit is available in two models. Features of the special include manual feed, swinging cone type reamer, single cutting wheel, etc. The model A standard feeds the knives automatically, has a safety guide ahead of knife cutting edge to control depth of cut, and self-centering V-jaws to hold pipe while cutting to prevent chattering.

♦ ♦ ♦

Centrifugal Pump—

Worthington Pump & Machinery Corp., Harrison, N. J., has developed a pump for handling liquids near their vapor pressures. The unit, shown herewith, is available for capacities of from 10 gallons per minute against heads of 50 to 110 feet with 12-inch submergence, to 175 gallons per minute against heads of 50 to 70 feet with 60-inch sub-



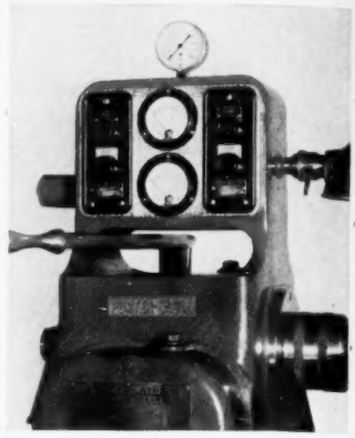
Worthington centrifugal pump for hot and volatile liquids

mergence. Compactness is a feature, overall floor space required by the largest unit being only 24 by 16 inches.

♦ ♦ ♦

Electrical Lathe Head—

Porter-Cable Machine Co., Syracuse, N. Y., is announcing an electrical head adaptable to either mechanical or hydraulic Carbo lathes. The unit, shown herewith, provides a central control for the entire electrical and pressure systems, bringing



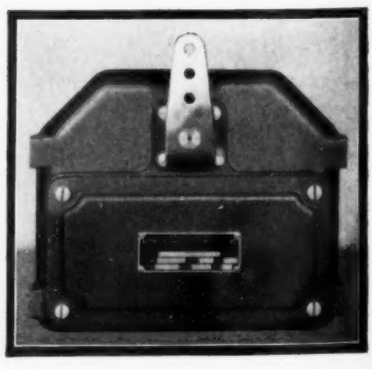
Electrical head for Porter-Cable lathe provides centralized control

them directly before the operator's eyes. The panel embodies the starting and stopping buttons for all motors, pressure gages for either air or hydraulic mechanisms, direct reading ammeters to show the amount of power being consumed and to enable the operator to maintain proper feeds and speeds, thus obtaining maximum efficiency of machine and cutting tools. The electrical head is a boon to the department supervisor; he can check operator and machine at a glance.

♦ ♦ ♦

Furnace Temperature Control

Automatic Temperature Control Co. Inc., 34 East Logan street, Philadelphia, announces that the demand



ATC controller operates either slip-stem or rotary valves

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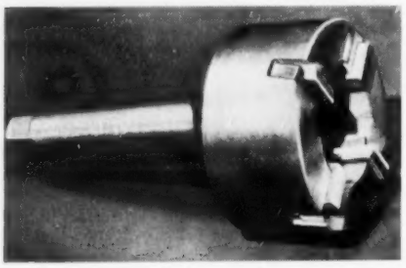
for furnace temperature control with minimum disturbance of furnace atmosphere has resulted in the development of two new types of multi-position controllers known as the Relatrol and the Balancer. Both units produce a corrective movement in a valve or dampener in exact relation to departure from the temperature setting, as measured by the actuating instrument. In external appearance both units are alike as shown on page 64. The Balancer is similar to the Relatrol except that it is provided with automatic means of load compensation and is recommended where load changes will be of considerable extent and duration.

♦ ♦ ♦

Adjustable Zee Lock Hollow Mill—

Ingersoll Milling Machine Co., Rockford, Ill., now is applying its zee lock cutter blade to inserted blade adjustable hollow mills. The



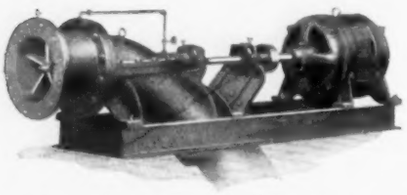
Ingersoll hollow mill with adjustable zee lock blades

serrations which locate the cutter blade are broached in the body so that by reinserting the blade in the succeeding position, the blades will be moved forward and inwardly a few thousandths of an inch and the cutter resized. Accurate diameters thus are maintained with a rigid tooth lock and a minimum of grinding. The cutter shown herewith is suited to use on lathes, drills or boring machines. Similar types with separate piloting arbor or a shell type to fit on a separate arbor are made.

♦ ♦ ♦

Axial Flow Pump—

Pennsylvania Pump & Compressor Co., Easton, Pa., is building an axial flow pump for handling large volumes of water at low heads. Differing from the regulation centrifugal pump, the new unit, shown herewith, consists simply of a pump casing in the shape of a tube and forming a part of the water passage. In this casing is placed a propeller somewhat similar to the propeller of a ship, and its rotation forces the water through the system. The pump can be arranged for various types of mounting. Uses include circulation of condenser cooling water, etc.



Pennsylvania axial flow pump

♦ ♦ ♦

Ball Bearings—

Hoover Steel Ball Co., Ann Arbor, Mich., announces seventy-five new sizes of radial and angular contact type ball bearings. These additions embrace both the single and double row types, all of which are in keeping with SAE and U. S. Navy department specifications covering design, tolerances, materials, etc.

♦ ♦ ♦

Dielectric Tester—

Acme Electric & Mfg. Co., Cleveland, is announcing a new dielectric or breakdown tester which not only indicates shorts, opens or grounds, but actually checks circuits at approved standard testing voltages. The tester, shown herewih, will permit

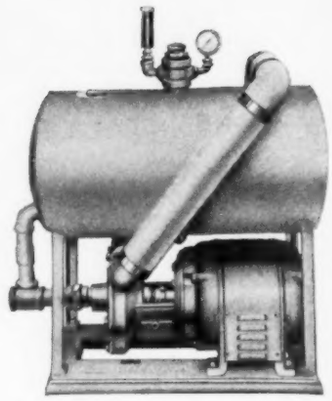
Acme dielectric tester

actual application of the standard testing voltage of double the rated voltage plus 1000 to the appliance device or equipment under test and thus prove the dielectric strength of the insulation to meet standard safety limits. Any winding with rotted, old or defective insulation below minimum safety standards would break down under test, consequently preventing the use of unsafe electrical equipment. Equipped with a sturdy metal handle, this unit lends itself to portable use by electrical equipment inspectors or maintenance men.

♦ ♦ ♦

Steam Return System—

American District Steam Co., North Tonawanda, N. Y., is introducing a condensate and steam return system for industrial use. Shown



Adsco-Becker condensate and steam return system

herewith, the unit is compact, motor-driven and has one moving part. It is closed to the atmosphere from the boiler, through the steam using equipment and directly back to the boiler at any pressure and at temperatures ranging from 275 to 350 degrees, depending upon conditions.

♦ ♦ ♦

Inclinable Press—

Niagara Machine & Tool Works, 637 Northland avenue, Buffalo, announces the addition of a new master series A inclinable press having a 1¼-inch diameter shaft. This small size unit, shown herewith, is designed for use in manufacturing light metal stampings. It is equipped with the Niagara fourteen point en-

Niagara A-1¼ inclinable press for light metal stampings

gagement sleeve clutch with positive stop, locking device and single stroke mechanism. An inclining device cuts handling time by allowing material to automatically drop through to the rear of the press after each stroke.

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Magnetic Separator—

Magnetic Mfg. Co., Milwaukee, has developed a magnetic separator which is particularly advantageous where space is limited. Built for removing minute magnetic particles from finely powdered material, the unit employs a conical shape magnet approximately 12 inches in diameter. It is equipped with a vibrating type feeder to discharge the material in a thin, even layer over a powerful magnetic field. The unit shown herewith was designed and built particularly for treating Plaskon, a synthetic powdered material from which numerous molded products now are being made.

High-duty magnetic separator built by Magnetic Mfg. Co.

• • •

Bottle Type Oiler—

Trico Fuse Mfg. Co., Milwaukee, is marketing bottle type oilers in a new style known as "Drip-Drop" for solid, wick or waste-packed bearings. This device, shown herewith, drops oil on the bearing from the top as the bearing needs it and eliminates the necessity for daily oiling by the hand method. The unit is made in three sizes.

Trico bottle type oiler eliminates necessity for daily hand oiling. Unit drops oil on bearing from top as needed

• • •

Spectrum Measuring Microscope—

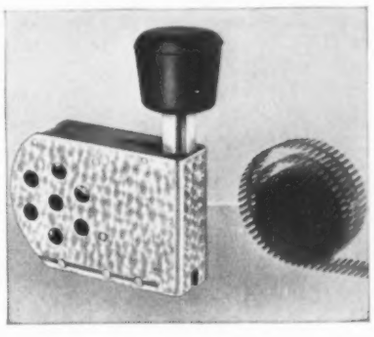
Bausch & Lomb Optical Co., Rochester, N. Y., is offering a new spectrum measuring microscope for the rapid and precise measurement of the linear intervals between spectrum lines on a photographic plate. It is applicable to a wide range of work such as measurement of thermal expansion of metals and the elongation of test specimens in creep tests under load.

Photographic plate or other object to be measured is carried in a horizontal position upon a sliding table to which a glass scale is rigidly attached. The object is, therefore, in constant fixed relation with a measuring device which is itself constant. The scale is 250.0 mm long, ruled directly upon a thick glass plate and is read by transmitted light. Magnified image of scale and vernier is projected by a microscope objective upon a horizontal ground glass screen underneath the eyepiece of the reading microscope.

• • •

Small Compact Stapler—

Paslode Co., 293A North Bank drive, Merchandise Mart, Chicago, is offering a vest-pocket size stapler with a magazine that carries 1000 staples in a single load. The small compact size of the unit, shown herewith, makes it convenient for the operator to carry. Uses include tag tacking, sign tacking, etc. The device will drive staples into cardboard, wood, etc. Three models are available, a one hand device, two-hand unit, and a hammer model.



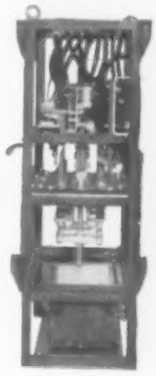
Paslode vest pocket size tacker holds 1000 staples

• • •

High Voltage Contactor—

General Electric Co., Schenectady, N. Y., is bringing out a high voltage alternating-current contactor employing the oil-blast principle of arc interruption. The unit, shown herewith, is intended for use in completely oil-immersed motor controllers requiring moderately high interrupting capacity.

The contactor is rated 200 amperes at 2200 to 4600 volts, and will interrupt 50,000 kva. It is latched in, and is tripped mechanically on short circuit by an instantaneous overcurrent relay. Thermal-induction relays give inverse-time protection for the motor in the event of sustained overloads, and time-delay undervoltage protection is also provided.



Oil blast principle of arc interruption is employed in this G-E high voltage alternating-current contactor for use in completely oil-immersed motor controllers

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Spray Gun Air Caps—

DeVilbiss Co., Toledo, O., has developed two new air caps for its type MBC spray gun. No. 76 cap is designed for use with lacquers, primers and heavy-bodied synthetics, while No. 54 produces a wide, even spray without split. It will find its most extensive use with portable outfits, although it is suitable for smaller industrial installations.

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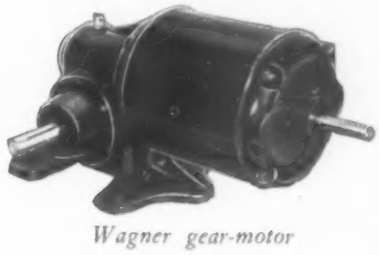
Gear-Motors—

Wagner Electric Corp., 6400 Plymouth avenue, St. Louis, is introducing fractional horsepower gear-motors that are suitable for direct connection to stokers, agitators, conveyors, low speed pumps, mixers, etc. The units, one of which is shown herewith, are available in single and double reduction types with right-angle shaft drive, and in single, double and triple reduction types with parallel shaft drive. These gear-motors are available for delivering power at speeds as low as six revolutions per minute.



Wagner gear-motor

Attack Steel Prices Again

(*Concluded from Page* 14)

that burden. If prohibition of the sale of intoxicating liquor proved to be too great a burden, would an effort of the Government to fix prices on bread, steel, clothing and cement and to penalize any lower prices be more successful?

The Wheeler-Utterback bill is an extension of a 28-year contention over steel pricing methods, as the table on Page 14 indicates.

Text of Anti-Basing Point Bill

To supplement existing antitrust acts, to protect the public against combinations in restraint of trade, to prevent unnecessary and wasteful cross hauling of commodities, to restore and preserve purchasing power, and to aid in the prevention of the recurrence of economic stringency, and for other purposes.

Sec. 1. It is hereby declared to be the policy of congress and the purpose of this act:

To prevent methods of pricing under which certain industries follow the practice of making uniform delivered prices, and of thus discriminating among purchasers by bearing substantially greater expense of transportation charges on sales to some customers than they bear on sales to other customers;

To abrogate formula methods of pricing collusive or otherwise, whereby all manufacturers, who follow the method quote and charge for any given destination identical delivered prices, and thus lessen or destroy competition in price in numerous industries;

To abrogate practices whereby manufacturers exclude buyers and the consuming public from, and themselves obtain, all the economic advantages of highway and waterway transportation and improvements;

To abrogate methods of pricing under which the consuming public is obliged to pay prices rendered higher than otherwise by a nation wide system of cross hauling of commodities, or which tend to prevent any manufacturer from accepting as low a net return in selling in the locality of his plant or plants as he accepts when selling to customers at a further distance therefrom; and

To abrogate methods of pricing whereby private buyers and county, municipal, state and federal governments receive only identical delivered quotations upon proposals to purchase materials issued for various private and public works, and are refused quotations f.o.b. the points or production.

Sec. 2. That section 1 of the act entitled "An act to supplement existing laws against unlawful restraints and monopolies, and for other purposes," approved Oct. 15, 1914, as amended, (U. S. C., title 15, sec. 12) is amended to read as follows:

"Sec. 1. 'That antitrust laws,' as used herein, includes the act entitled 'An act to protect trade and commerce against unlawful restraints and monopolies,' approved July 2, 1890; sections 73 to 77, inclusive of an act entitled 'An act to reduce taxation, to provide revenue for the government, and for other purposes,' of Aug. 27, 1894; entitled 'An act entitled, 'An act to amend section 73 and 76 of the act of Aug. 27, 1894, and for other purposes,' approved Feb. 12, 1913, and also this act is amended:

"Commerce" as used herein, means trade or commerce among the several states and with foreign nations, or between the District of Columbia or any territory of the United States and any state, territory or foreign nations, or between any insular possessions or other places under the jurisdiction of the United States, or between any such possession or place and any state or territory of the United States or the District of Columbia or any foreign nation, or within the District of Columbia or any territory or any insular possession or other place under the jurisdiction of the United States.

The word "person" or "persons" shall include corporations, common law trusts, or any organized group of persons, whether incorporated or not, or any receiver, trustee or other liquidating agent of any of the foregoing.

"Price" and "prices," except when used in the phrase, "delivered price," means the monetary amount or amounts received by the vendor for each commodity unit, after deducting actual freight or cost of other transportation, if any, allowed or defrayed by the vendor.

Sec. 3. That said act entitled "An act to supplement existing laws against unlawful restraints and monopolies, and for other purposes," approved Oct. 15, 1914, as amended, is further amended by adding at the end thereof the following additional sections:

"Sec. 27.—It shall be unlawful for any person in commerce to add to the shipping point of any commodity for sale by him a charge for delivery to destinations other than the actual cost of delivery through such agency as the purchaser may elect to specify.

"Sec. 28. It shall be unlawful for any person to enter into an agreement or understanding, express or implied, with any other person or persons to use, or to continue or maintain, any method or system whereby such person shall quote or charge for any commodity, in the course of commerce, prices which shall include as an item or element thereof any amount or amounts, measured by any freight or other transportation rates, not actually defrayed by such person in the delivery of said commodity to his customers.

"Sec. 29. It shall be unlawful for any person to quote a delivered price for any commodity sold in commerce without stating what portion thereof, has been, or is to be, actually disbursed by such person for freight or other cost of transportation, and without giving the prospective purchaser the option of accepting delivery f.o.b. such person's shipping point, at a price which shall be derived by subtracting from the delivered price quoted the actual amount disbursed or to be disbursed by such person for freight or other transportation costs.

"Sec. 30. Proceedings on behalf of the public, and by private persons deeming themselves aggrieved by alleged violations of sections 27, 28 or 29 of this act may be undertaken and prosecuted in the same manner, and to the same degree, and with the same procedure and powers, except insofar as the same shall be clearly inapplicable, as are provided, with respect to proceedings on behalf of the public or by private persons, by sections 4, 6, 11, 12, 13 and 15 to 19 inclusive, and the second paragraph of Section 5 of this act.

"Sec. 4. This mandatory act may be cited as the 'Anti-Basing Point Act.'"

Metal Decorating Oven Built To Handle Exacting Work

(*Concluded from Page* 48)

from the first zone, at which point the air discharged from the oven is removed. Exhausting here is claimed to have two advantages: First, it removes the volatiles at the point of greatest concentration, and second, the discharged air is taken from the point of lowest temperature, the air having just passed over the cold entering sheets.

In any oven, the fuel burned is used primarily to heat the metal sheets. However, part of the heat goes into the conveyor, radiation loss through the panels and exhaust to atmosphere. This new oven is designed to keep all these items down to a minimum. The amount of heat going into the sheet and conveyor is a constant at any temperature; however, with a rapid uniform flow of clean fresh air the sheets can be baked satisfactorily at a lower temperature, thus keeping this item down to a minimum.

Radiation loss through the panels is kept down by using the most effective type of insulation available. The exhaust to atmosphere has no maximum limit, but the minimum possible is determined by the allowable concentration of volatiles to keep below the explosive range, and also at a concentration which will not affect the quality of the product. By using a single source of high temperature air, it is possible to control this volume to the minimum permissible, and by the use of fresh air to obtain a quality product with this minimum permissible exhaust.

As previously mentioned, cooling is accomplished by blowing cold air uniformly over the sheets after they leave the hot zone of the oven. The circulating fan takes air from outdoors, indoors, or any source of cool clean air. This air, under pressure, is supplied to the series of specially-shaped nozzles directly under the conveyor and blown up through the sheets. Because of this special design and arrangement, it is said that more than five times the volume of air actually supplied to the nozzles passes over the sheets because of induced flow. Minimum of equipment and power is used to give the maximum cooling effect.

Heat Is Conserved

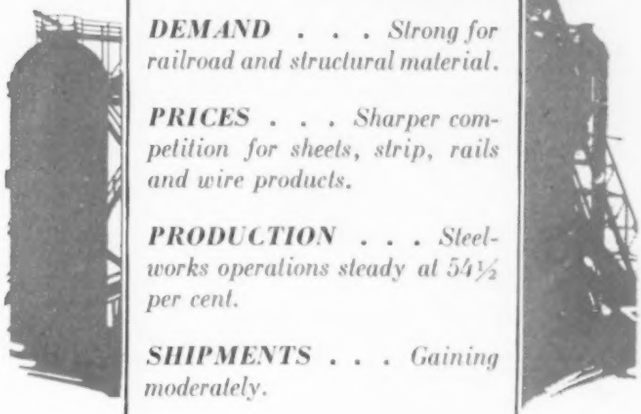
Above the first portion of the cooling zone, the hood and stack discharges the heated air. Provision may be made for recovering a portion of this heated air by recirculation to the heating system. Over the remainder of the cooling zone, where the air is not so warm, it is dissipated directly into the room so as not to exhaust too great a volume, thereby keeping room ventilation requirements down to a minimum.

Gas, oil, or butane can be burned in the heaters. By-product gases, unscrubbed or heavy oils may be used with the indirect heater.

The new equipment and methods described are covered by patents issued and pending.

Railroad and Structural Buying Accelerated

Steelworks Held at 54½%; Second Quarter Prices Awaited; Scrap Soars



MARKET IN TABLOID

DEMAND . . . *Strong for railroad and structural material.*

PRICES . . . *Sharper competition for sheets, strip, rails and wire products.*

PRODUCTION . . . *Steelworks operations steady at 54½ per cent.*

SHIPMENTS . . . *Gaining moderately.*

RAILROAD and structural steel demand last week reached a new peak for the year, bracing the steelworks rate at 54½ per cent, against the freeze-up in automobile requirements.

As there is no indication of abatement in railroad buying, and as construction work is accelerating with approach of spring, steelmakers look to an early revival in automobiles to expand operations.

Meanwhile, they are wrestling with one of the most difficult price problems since abandonment of the steel code. Sharp and widespread competition in some of the lighter finished steel products has delayed announcements for second quarter. Last week it was generally believed most of the official prices would be reaffirmed.

The $3 a ton concession on sheets and strip, at first intended only for Michigan automobile manufacturers, has spread to Pittsburgh, eastern and other districts. Mills are considering quantity differentials for these products, similar to those in effect on bars. Nails and some other wire products have sold $2 a ton under the official market.

Pig iron prices have been extended for second quarter. This product shares some of the firmness of scrap. Scrap shortages, augmented by weather conditions, have led to strong advances. Pittsburgh dealers are holding No. 1 heavy melting steel at $16. STEEL's scrap composite, based on sales, is up 58 cents to $14.29.

Since Dec. 1, three months in which railroads shape up their early buying programs, rail orders have totaled 370,069 tons, compared with 111,457 tons in the same period a year ago. Freight car awards have amounted to 17,501, compared with 940. It is the largest buying movement since PWA poured out funds to the railroads in 1934, and most of it is being done with the carriers' money.

Including car repair material, it is probable the railroads have purchased more than 600,000 tons of steel since Dec. 1. Outstanding purchases last week included 31,000 tons of rails, Western Pacific; 17,800 tons, St. Louis, San Francisco; freight car awards, 250 each for Northern Pacific and Union Pacific; and 300, Missouri Pacific.

Structural awards totaled 30,697 tons, largest since the June, 1935, building season. These included 6500 tons for a city hall, Kansas City, Mo.; 6325 tons, Ft. Peck dam, Montana; 3500 tons, federal reserve building, Washington; 3100 tons for a commercial building, New York; and 2000 tons for American Steel & Wire Co.'s rod mill building, Joliet, Ill. For New York's Triboro bridge, 4000 tons of reinforcing bars were placed.

Sun Shipbuilding & Dry Dock Co., Chester, Pa., purchased 20,000 tons of plates for recent vessel awards, San Francisco bought 4400 tons of plates for a pipe line. Early award of 45,000 to 50,000 tons of steel pipe for the Columbia Gas & Electric Co.'s 285-mile line into Detroit now seems probable.

Automobile output last week totaled 62,800 units, down 12,200. Manufacturers have been specifying steel a little more liberally for March car requirements.

Further evidence of the remarkable industrial recovery in Great Britain is given in STEEL's cable from London. The British steel industry is working at capacity, and there is a shortage of pig iron and semifinished steel.

Pittsburgh district steelworks operations last week declined 1 point to 39 per cent; Chicago ½-point to 59; New England 8 to 75; Cincinnati 8 to 72. Youngstown was up 3 to 65; Birmingham 3 to 66; Buffalo 1 to 35; and others unchanged.

STEEL's iron and steel price composite advanced 9 cents to $33.54. Pending further price clarification, finished steel index remains $53.70.

COMPOSITE MARKET AVERAGES

	Feb. 22	Feb. 15	Feb. 8	One Month Ago Jan., 1936	Three Months Ago Nov., 1935	One Year Ago Feb., 1935	Five Years Ago Feb., 1931
Iron and Steel	$33.54	$33.45	$33.44	$33.34	$33.15	$32.54	$31.64
Finished Steel	53.70	53.70	53.70	53.70	53.70	54.00	49.42
Steelworks Scrap	14.29	13.71	13.42	13.15	12.92	11.66	10.39

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Feb. 22, 1936	Jan., 1936	Nov., 1935	Feb., 1935
Steel bars, Pittsburgh	1.85c	1.85	1.85	1.80
Steel bars, Chicago	1.90	1.90	1.90	1.85
Steel bars, Philadelphia	2.16	2.16	2.16	2.09
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.75
Shapes, Pittsburgh	1.80	1.80	1.80	1.80
Shapes, Philadelphia	2.01½	2.01½	2.01½	2.00½
Shapes, Chicago	1.85	1.85	1.85	1.85
Tank plates, Pittsburgh	1.80	1.80	1.80	1.80
Tank plates, Philadelphia	2.00	1.99	1.99	1.98½
Tank plates, Chicago	1.85	1.85	1.85	1.85
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.85
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.40
Sheets, No. 24, galv., Pitts.	3.10	3.10	3.10	3.10
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.95
Sheets, No. 24, hot anneal., Gary	2.50	2.50	2.50	2.50
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	3.20
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box Pitts.	5.25	5.25	5.25	5.25
Wire nails Pitts.	2.40	2.40	2.40	2.60

Semifinished Material

Sheet bars, open-hearth, Youngs.	$30.00	30.00	29.50	28.00
Sheet bars, open-hearth, Pitts.	30.00	30.00	29.50	28.00
Billets, open-hearth, Pittsburgh	29.00	29.00	28.50	27.00
Wire rods, Pittsburgh	40.00	29.00	38.00	38.00

Pig Iron

Bessemer, del. Pittsburgh	$20.8132	20.8132	20.8132	19.76
Basic, Valley	19.00	19.00	19.00	18.00
Basic, eastern, del. eastern Pa.	20.8132	20.8132	20.8132	19.76
No. 2 fdry., del. Pittsburgh	20.3132	20.3132	20.3132	19.26
No. 2 fdry., Chicago	19.50	19.50	19.50	18.50
Southern No. 2, Birmingham	15.50	15.50	14.75	14.50
Southern No. 2, del. Cincinnati	20.2007	20.2007	20.2007	19.13
No. 2X eastern, del. Phila.	21.6882	21.6882	21.6882	20.63
Malleable, Valley	19.50	19.50	19.50	18.50
Malleable, Chicago	19.50	19.50	19.50	18.50
Lake Sup. charcoal, del. Chi.	25.2528	25.2528	25.2528	24.04
Ferromanganese, del. Pitts.	80.13	90.13	90.13	89.79
Gray forge, del. Pittsburgh	19.6741	19.67	19.67	18.63

Scrap

Heavy melting steel, Pittsburgh	$15.00	14.50	13.65	13.25
Heavy melt. steel, No. 2, east Pa.	12.50	11.37½	11.00	10.15
Heavy melting steel, Chicago	14.75	13.40	13.20	11.65
Rails for rolling, Chicago	15.75	14.25	14.30	12.55
Railroad steel specialties, Chicago	16.25	14.40	13.75	12.50

Coke

Connellsville, furnace, ovens	$3.50	3.50	3.55	3.60
Connellsville, foundry, ovens	4.25	4.00	4.35	4.60
Chicago, by-product foundry, del.	9.75	9.75	9.75	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week

Sheet Steel

Hot Rolled No. 10, 24-48 in.

*Pittsburgh	1.70c-1.85c
Gary	1.95c
Chicago, delivered	1.98c
Detroit, del.	1.90c
*New York, del.	2.05c-2.20c
*Philadelphia, del.	2.01c-2.16c
Birmingham	2.00c
St. Louis, del.	2.18c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

*Pittsburgh	2.25c-2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, delivered	2.45c
*New York, del.	2.60c-2.75c
*Philadelphia, del.	2.56c-2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered	3.23c
Philadelphia, del.	3.41c
*New York, del.	3.30c-3.45c
Birmingham	3.25c
St. Louis, del.	3.43c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.08c

Cold Rolled No. 10

*Pittsburgh	2.35c-2.50c
Gary	2.60c
Detroit, delivered	2.55c
*Philadelphia, del.	2.66c-2.81c
*New York, del.	2.70c-2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

*Pittsburgh	2.80c-2.95c
Gary	3.05c
Detroit, delivered	3.00c
*Philadelphia, del.	3.11c-3.26c
*New York, del.	3.15c-3.30c

Enameling Sheets

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold strip	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered	2.22c
Buffalo, delivered	2.05c
Chicago or Gary	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.08c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½
Boston, delivered	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel

(Base, 5 to 25 tons)

Pittsburgh	1.85c
Chicago or Gary	1.90c
Duluth	2.00c
Birmingham	2.00c
Cleveland	1.90c
Buffalo	1.95c
*Detroit, delivered	1.90c-2.00c
Pacific ports, f.o.b. cars, dock	2.40c
Philadelphia, del.	2.16c
Boston, delivered	2.27c
New York, del.	2.20c
Pitts., forg. qual.	2.10c

Rail Steel

To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	2.06c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

*Pittsburgh	1.95c-2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young.	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. car docks	2.45c
Philadelphia, del.	2.11c-2.16c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight or mixed carloads; less carloads $4 higher; less carloads fencing $5 over base column.)

Base Pitts.-Cleve. 100 lb. keg.	
*Stand. wire nails	$2.30- 2.40
*Cement c't'd nails	2.30- 2.40
*Galv. nails, 15 gage and coarser	4.30- 4.40
* do. finer than 15 ga.	4.80- 4.90

(Per pound)

*Polished staples	3.00c-3.10c
*Galv. fence staples	3.25c-3.35c
*Barbed wire, galv.	2.70c-2.80c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$61.00

To Manufacturing Trade

Plain wire, 6-9 gage	2.30c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring, wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Gary, Ind., Cleve., Chi., up 5c Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massilon, Canton, Bethlehem 2.45c

Alloy	Diff.	Alloy	Diff.
S.A.E.		S.A.E.	
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo.	0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni	1.05
5100 0.80-1.10 Cr	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon Van.	0.95
9250 carbon base plus extras	

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23⅛-in.	
*Pittsburgh	1.70c-1.85c
Chicago or Gary	1.95c
Birmingham base	2.00c
Detroit, del.	1.90c
*Philadelphia, del.	2.01c-2.16c
New York, del.	2.20c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
*Cold strip, Pitts. Cleveland	2.45c-2.60c
Detroit, del.	2.65c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts.	
20-45 lbs.	$28.00
45-50 lbs.	$25.00
50-60 lbs.	$26.00
70-75 lbs.	$24.50
80-90 lbs.	$26.00
100 lbs.	$27.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll, qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
Spikes, R. R. base	2.60c
Track bolts, base	3.60c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $2; 16 and 20 lbs., up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage and Machine

½ x 6 and smaller	70-10-5 off
Do. larger	70-10 off
Tire bolts	55 off

Plow Bolts

All sizes	70-10 off

Stove Bolts

In packages with nuts attached 72½-10 off; in packages with nuts separate 72½-10-5 off; in bulk 82½ off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.

Step bolts	65-5 off
Elevator bolts	65-5 off

Nuts

S. A. E. semifinished hex.; ½ to ⅞-inch	60-20-15 off
Do., ½ to 1-inch	60-20-15 off
Do., over 1-inch	60-20-15 off

Hexagon Cap Screws

Milled	80-10-10 off
Upset, 1-in., smaller	85 off

Square Head Set Screws

Upset, 1-in., smaller	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila. to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more, no discount on size extras	$3.05
Do., under 5 kegs; no disc. on size extras	$3.20

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.

Butt Weld

In.	Blk.	Galv.
Steel		
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

Steel		
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

Steel	
½, butt weld	57½
⅛-inch butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.		*Charcoal Iron*	
Lap Weld Steel			
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots of 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are quoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4 in.	46.00

Class A pipe $3 over Class B Stnd. fitgs., Birm. base $160.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$29.00
Philadelphia	34.67
Duluth	31.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chi., Buff.	35.00
Forging, Duluth	37.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	30.00

Slabs

Pitts., Chi., Cleve., Young.	29.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	40.00
Chicago	41.00
Worcester, Mass.	42.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.80c

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur.	$3.50- 3.65
Connellsville, fdry.	4.25
*Connel., prem. fdry.	5.50
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.70-10.15
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del.	11.50
St. Louis, del.	10.00-10.50
Birmingham, ovens	6.50
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	9.75
Buffalo, ovens	7.50- 8.00
Detroit, ov., out. del	9.00
Philadelphia, del.	9.38

Coke By-Products

Per gallon, producers' plants.

Tank lots	Spot
Pure and 90% benzol	18.00c
Toluol	30.00c
Solvent naphtha	30.00c
Commercial xylol	30.00c

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	6.75c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
Bethlehem, Pa.	$20.50	$21.00	$20.00	$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00
Delivered from Basing Points:				
Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	†19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20.20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.07	21.07
Muskegon, Mich., from Chicago or Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	Neville base plus $1.21 switching charges			67c, 81c and
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25

Delivered from Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
St. Louis, northern	20.00	20.00	19.50	.....
St. Louis from Birmingham	†19.62	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $24.00, Phila. base, standard and copper bearing, $25.13.

Gray Forge		Charcoal	
Valley furnace	19.00	Lake Superior fur.	$22.00
Pitts. dist. fur.	19.00	Do., del. Chicago	25.25
		Lylees, Tenn.	22.50

Silvery†

Jackson county, O., base; 6-6.50 per cent $22.75; 6.51-7—$23.25; 7-7.50—$23.75; 7.51-8—$24.25; 8-8.50—$24.75; 8.51-9—$25.25; 9-9.50—$25.75. Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon. 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$55.00

First Quality

Pa., Ill., Md., Mo., Ky.	$45.00
Alabama, Ga.,	$38.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.00
Ga., Ala.	35.00

Ohio

First quality	$40.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	48.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	45.00
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$20.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all-rail	$17.50
Do., for barge	$17.50

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	75.00
Do., Balti., base	75.00
Do., del. Pittsb'gh	80.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carb.	85.00
2% carbon, 90.00; 1%,	100.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont.	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $3 unitage	58.50
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $3 unitage	75.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads, Quan. diff. apply.

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Straits Tin New York Spot	Straits Tin New York Futures	Lead New York	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
	Copper										
Feb. 15	9.25	9.37½	8.85	47.87½	46.00	4.50	4.35	4.85	*19.00	12.87½	35.00
Feb. 17	9.25	9.37½	8.85	48.00	46.30	4.50	4.35	4.85	*19.00	12.87½	35.00
Feb. 18	9.25	9.37½	8.85	47.75	46.00	4.50	4.35	4.85	*19.00	13.25	35.00
Feb. 19	9.25	9.37½	8.85	48.00	46.25	4.50	4.35	4.85	*19.00	13.25	35.00
Feb. 20	9.25	9.37½	8.85	48.00	46.37½	4.50	4.35	4.85	*19.00	13.25	35.00
Feb. 21	9.25	9.37½	8.95	47.50	46.12½	4.50	4.35	4.85	*19.00	13.25	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.62½
Copper hot rolled	16.50
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
Tubes	
High yellow brass	16.87½
Seamless copper	17.00
Rods	
High yellow brass	13.12½
Copper, hot rolled	13.50
Anodes	
Copper untrimmed	14.00
Wire	
Yellow brass (high)	15.12½

OLD METALS

Dealers' buying prices, cents lb.

No. 1 Composition Red Brass	
New York	5.75- 6.00
Cleveland	6.50- 6.75
*Chicago	6.12½-6.37½
St. Louis	5.75- 6.00
Heavy Copper and Wire	
New York, No. 1	7.25- 7.50
*Chicago, No. 1	7.12½-7.62½
Cleveland	6.75- 7.00
St. Louis, No. 1	7.00- 7.37½
Composition Brass Borings	
New York	5.25- 5.50
Light Copper	
New York	6.00- 6.25
*Chicago	5.62½-6.12½
Cleveland	6.00- 6.25
St. Louis	5.75- 6.00
Light Brass	
*Chicago	3.62½-3.87½
Cleveland	3.25- 3.50
St. Louis	3.50- 3.75
Lead	
New York	3.50- 3.75
Cleveland	3.50- 3.75
Chicago	3.37½-3.62½
St. Louis	3.25- 3.75
Zinc	
New York	2.00- 2.25
Cleveland	2.50- 2.75
St. Louis	2.50- 3.00
Aluminum	
Borings, Cleveland	9.00- 9.50
Mixed, cast, Cleve.	13.00-13.25
Mixed, cast, St. L.	12.50-12.75
Clips, soft, Cleve.	15.00-15.25

SECONDARY METALS

Brass ingot, 85-5-5-5	9.50
Stand. No. 12 alum.	16.75-17.25

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	10.00-11.00
Boston, dock, expt.	10.50-10.75
Boston, domestic	9.00
Buffalo, No. 1	12.50-13.00
Buffalo, No. 2	11.25-11.75
Chicago, No. 1	14.50-15.00
Cleveland, No. 1	13.50-14.00
Cleveland, No. 2	12.50-13.00
Detroit, No. 1	11.50-12.00
Detroit, No. 2	10.75-11.25
Eastern Pa., No. 1	13.50-14.00
Eastern Pa., No. 2	12.50
Federal, Ill.	11.50-12.00
Granite City, R. R.	12.50-13.00
Granite City, No. 2	10.75-11.25
N. Y., deal. No. 2	8.00- 8.50
N. Y., deal. barge (No. 1 for export)	9.00- 9.50
Pitts., No. 1 (R. R.)	15.50-16.00
Pitts., No. 1 (dlr.)	14.75-15.25
Pittsburgh, No. 2	13.75-14.25
St. Louis	11.50-12.00
Toronto, dealers	7.50
Valleys, No. 1	15.00-15.50

COMPRESSED SHEETS

Buffalo, dealers	11.25-11.75
Chicago, factory	13.25-13.75
Chicago, dealer	12.25-12.75
Cleveland	13.25-13.75
Detroit	11.75-12.25
E. Pa., new mat.	13.00-13.50
Pittsburgh	15.25-15.75
St. Louis	9.50-10.00
Valleys	14.50-15.00

BUNDLED SHEETS

Buffalo	10.25-10.75
Cincinnati, del.	8.50- 9.00
Cleveland	10.00-10.50
Pittsburgh	13.75-14.25
St. Louis	8.50- 9.00
Toronto, dealers	4.50

SHEET CLIPPINGS, LOOSE

Chicago	10.00-10.50
Cincinnati	8.50- 9.00
Detroit	8.50- 9.00
St. Louis	7.00- 7.50

STEEL RAILS, SHORT

Birmingham	12.50-13.00
Buffalo	15.25-15.75
Chicago (3 ft.)	16.00-16.50
Chicago (2 ft.)	17.00-17.50
Cincinnati, del.	14.50-15.00
Detroit	13.50-14.00
Pitts., open-hearth, 3 ft. and less	16.50-17.00
St. Louis, 2 ft. & less	14.25-14.75

STEEL RAILS, SCRAP

Boston	9.00
Chicago	14.50-15.00
Pittsburgh	15.50-16.00
St. Louis	13.25-13.75
Buffalo	13.00-13.50
Toronto, dealers	8.50

STOVE PLATE

Birmingham	7.00- 7.50
Boston, dealers	6.00- 6.25
Buffalo	11.00-11.50
Chicago	8.50- 9.00
Cincinnati, dealers	8.00- 8.50
Detroit, net	8.50- 9.00
Eastern Pa.	11.00-11.50
N. Y., deal. fdry.	6.50- 7.00
St. Louis	7.50- 8.00
Toronto, dealers, net	5.50

COUPLERS, SPRINGS

Buffalo	14.50-15.00
Chicago, springs	16.00-16.50
Eastern Pa.	16.50-17.00
Pittsburgh	17.00-17.50
St. Louis	13.50-14.00

ANGLE BARS—STEEL

Chicago	15.50-16.00
St. Louis	14.00-14.50
Buffalo	14.50-15.00

RAILROAD SPECIALTIES

Chicago	16.00-16.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	14.75-15.25
Cleveland, billet, bloom crops	16.50-17.00
Eastern Pa., crops	16.50-17.00
Pittsburgh, billet, bloom crops	17.25-17.75
Pittsburgh, sheet bar crops	16.75-17.25

FROGS, SWITCHES

Chicago	14.50-15.00
St. Louis, cut	12.25-12.75

SHOVELING STEEL

Chicago	14.50-15.00
Federal, Ill.	11.50-12.00
Granite City, Ill.	10.75-11.25
Toronto, dealers	6.50

RAILROAD WROUGHT

Birmingham	7.50- 8.00
Boston, dealers	6.00- 6.50
Buffalo, No. 1	11.25-11.75
Buffalo, No. 2	12.50-13.00
Chicago, No. 1, net	13.00-13.50
Chicago, No. 2	14.50-15.00
Cincinnati, No. 2	11.50-12.00
Eastern Pa.	13.50-14.00
St. Louis, No. 1	11.00-11.50
St. Louis, No. 2	12.50-13.00
Toronto, No. 1. dlr.	7.00

SPECIFICATION PIPE

Eastern Pa.	11.50
New York, dealers	7.25- 7.75

BUSHELING

Buffalo, No. 1	11.25-11.75
Chicago, No. 1	13.00-13.50
Cinci., No. 1, deal.	8.50- 9.00
Cincinnati, No. 2	5.50- 6.00
Cleveland, No. 2	8.75- 9.00
Detroit, No. 1, new	11.00-11.50
Valleys, new, No. 1	14.50-15.00
Toronto, dealers	6.00

MACHINE TURNINGS

Birmingham	6.00- 7.00
Boston, dealers	3.75-3.90
Buffalo	6.50- 7.00
Chicago	7.00- 7.50
Cincinnati, dealers	6.50- 7.00
Cleveland	8.25- 8.50
Detroit	6.50- 7.00
Eastern Pa.	8.00- 8.50
New York, dealers	4.00- 4.50
Pittsburgh	10.25-10.75
St. Louis	4.50- 5.00
Toronto, dealers	4.00
Valleys	10.50-11.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	3.00- 3.25
Buffalo	8.25- 8.75
Cincinnati, dealers	6.00- 6.50
Cleveland	8.75- 9.00
Detroit	7.00- 7.50
Eastern Pa.	6.50
New York, dealers	3.25- 3.75
Pittsburgh	8.50- 9.25
Toronto, dealers	4.00

CAST IRON BORINGS

Birmingham, plain	5.00- 6.00
Boston, chemical	6.50- 7.00
Boston, dealers	3.50- 4.00
Buffalo	8.25- 8.75
Chicago	7.50- 8.00
Cincinnati, dealers	6.00- 6.50
Cleveland	8.75- 9.00
Detroit	7.00- 7.50
E. Pa., chemical	10.00- 12.00
New York, dealers	3.50- 4.00
St. Louis	4.50- 5.00
Toronto, dealers	5.00

PIPE AND FLUES

Cincinnati, dealers	8.00- 8.50
Chicago, net	8.50- 9.00

RAILROAD GRATE BARS

Buffalo	10.25-10.75
Chicago, net	9.00- 9.50
Cincinnati	7.00- 7.50
Eastern Pa.	11.00-11.50
New York, dealers	6.50- 7.00
St. Louis	7.50- 8.00

FORGE FLASHINGS

Boston, dealers	7.00- 7.50
Buffalo	11.25-11.75
Cleveland	11.50-12.00
Detroit	10.50-11.00
Pittsburgh	13.75-14.25

FORGE SCRAP

Boston, dealers	4.50- 5.00
Chicago, heavy	16.00-16.50
Eastern Pa.	12.00-12.50

ARCH BARS, TRANSOMS

St. Louis	13.00-13.50

AXLE TURNINGS

Boston, dealers	3.75- 4.25
Buffalo	10.50-11.00
Chicago, elec. fur.	14.00-14.50
Eastern Pa.	11.50
St. Louis	9.00- 9.50
Toronto	4.50

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	11.00-11.25
Buffalo	15.25-15.75
Chicago, net	15.50-16.00
Eastern Pa.	17.00
St. Louis	13.50-14.00
Toronto	8.50

SHAFTING

Boston, ship. point.	13.25-13.50
Eastern Pa.	18.50
New York, dealers	13.75-14.25
St. Louis	13.00-13.50

CAR WHEELS

Birmingham	10.00-11.00
Boston, iron deal.	7.75- 8.00
Buffalo, iron	12.75-13.25
Buffalo, steel	15.25-15.75
Chicago, iron	14.50-15.00
Chicago, rolled steel	15.50-16.00
Cincinnati, iron	11.50-12.00
Eastern Pa., iron	14.50-15.00
Eastern Pa., steel	16.50-17.00
Pittsburgh, iron	14.75-15.25
Pittsburgh, steel	17.00-17.50
St. Louis, iron	11.50-12.00
St. Louis, steel	13.25-13.75
Toronto, net	8.50

NO. 1 CAST SCRAP

Birmingham	11.00-12.00
Boston, No. 1 mach.	9.00- 9.25
Boston, No. 2	8.75- 9.00
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	12.50-13.00
Buffalo, mach.	13.50-14.00
Chicago, agri. net	10.50-11.00
Chicago, auto	11.50-12.00
Chicago, mach. net	12.50-13.00
Chicago, railr'd net	11.50-12.00
Cinci., mach. cup	11.00-11.50
Cleveland, mach.	14.50-15.00
Detroit, auto, net	12.00-12.50
Eastern Pa., cupola	13.50-14.00
E. Pa., mixed yard	12.00-12.50
Pittsburgh, cupola	13.75-14.25
San Francisco, del.	13.50-14.00
Seattle	7.50- 9.00
St. Louis, No. 1	11.25-11.75
St. L., No. 1 mach.	12.50-13.00
Toronto, No. 1, mach., net	9.00

HEAVY CAST

Boston, del.	7.75- 8.00
Buffalo, break.	11.00-11.50
Cleveland, break.	11.50-12.00
Detroit, No. 1 mach. net	12.00-12.50
Detroit, break.	10.00-10.50
Detroit, auto net	12.00-12.50
Eastern Pa.	13.00-13.50
N. Y., break. deal.	8.75- 9.25
Pittsburgh	13.00-13.50

MALLEABLE

Birmingham, R. R.	11.50-12.50
Boston, consum.	13.50-14.50
Buffalo	15.75-16.25
Chicago, R. R.	17.00-18.00
Cincinnati, agri. del.	13.00-13.50
Cleveland, rail	16.50-17.00
Detroit, auto, net	14.50-15.00
Eastern Pa., R.R.	16.50-17.00
Pittsburgh, rail	17.25-17.75
St. Louis, R. R.	14.25-14.75
Toronto, net	7.00

RAILS FOR ROLLING

5 feet and over

Birmingham	11.50-12.00
Boston, dealers	9.00
Buffalo	13.00-13.50
Chicago	15.50-16.00
Eastern Pa.	14.00-14.50
New York, dealer	9.75-10.25
St. Louis	14.25-14.75

LOCOMOTIVE TIRES

Chicago (cut)	16.00-16.50
St. Louis, No. 1	12.00-12.50

LOW PHOS. PUNCHINGS

Buffalo	14.75-15.25
Chicago	16.00-16.50
Eastern Pa.	16.00-16.50
Pittsburgh (heavy)	16.75-17.25
Pittsburgh (light)	16.00-16.50

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.50
No. Afr. low phos.	10.50
Swedish basic, 65%	9.50
Swedish low phos.	10.50
Spanish No. Africa basic, 50 to 60%	10.50
Tungsten, spot sh. ton unit, duty pd.	$15.85-16.00
N. F., fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	19.25

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots

Caucasian, 52-55%	26.00
So. African, 52%	26.50
So. Afr., 49-51%	25.50
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	
Baltimore*	3.00c
Boston††	3.10c
Buffalo	3.00c
Chattanooga	3.36c
Chicago (j)	3.00c
Cincinnati	3.22c
Cleveland	3.00c
Detroit	3.09c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.11c-3.26c
New Orleans	3.35c
New York‡ (d)	3.31c
Pitts. (h)	2.95c-3.10c
Philadelphia*	3.03c
Portland	3.50c
San Francisco	3.25c
Seattle	3.70c
St. Louis	3.25c
St. Paul	3.25c-3.40c
Tulsa	3.25c
IRON BARS	
Portland	3.40c
Chattanooga	3.36c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.22c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.25c
Tulsa	3.25c
REINFORCING BARS	
Buffalo	2.60c
Chattanooga	3.36c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.25c
Tulsa	3.25c
Young.	2.30c-2.60c
SHAPES	
Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York‡(d)	3.37c
Philadelphia*	2.98c
Pittsburgh (h)	3.15c
Portland (i)	3.50c
San Francisco	3.25c
Seattle (i)	3.70c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c
PLATES	
Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York‡(d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.35c
San Francisco	3.25c
Seattle	3.55c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c
NO. 10 BLUE	
Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.75c
Milwaukee	3.16c
New Orleans	3.55c
New York‡(d)	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Fracisco	3.35c
Seattle	3.70c
St. Louis	3.45c
St. Paul	3.30c
Tulsa	3.70c
NO. 24 BLACK	
Baltimore*†	3.60c
Boston (g)	3.95c
Buffalo	3.25c
Chattanooga	4.16c
Chicago	3.85c
Cincinnati	4.02c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New Orleans	4.50c
New York‡(d)	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.00c
Seattle	4.40c
St. Louis	4.10c
St. Paul	3.90c
Tulsa	4.75c
NO. 24 GALV. SHEETS	
Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.95c
New York‡(d)	4.30c
Philadelphia*†	4.40c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	4.50c
Seattle	5.00c
St. Louis	4.65c
St. Paul	4.50c
Tulsa	5.10c
BANDS	
Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅛-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York‡(d)	3.56c
Philadelphia	3.18c
Pittsburgh (h)	3.20c
Portland	4.25c
San Francisco	4.10c
Seattle	4.25c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.45c
HOOPS	
Baltimore	2.30c
Boston††	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York‡(d)	3.56c
Philadelphia	3.43c
Pittsburgh (h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.55c
St. Paul	3.55c
COLD FIN. STEEL	
Baltimore (c)	3.73c
Boston	3.90c
Buffalo (h)	3.55c
Chattanooga*	4.13c
Chicago (h)	3.50c
Cincinnati	3.72c
Cleveland (h)	3.50c
Detroit	3.79c
Los Ang. (f) (d)	5.85c
Milwaukee	3.61c
New Orleans	4.30c
New York‡(d)	3.81c
Philadelphia	3.76c
Pittsburgh	3.50c
Portland (f) (d)	6.15c
San Fran.(f) (d)	5.95c
Seattle (f) (d)	6.15c
St. Louis	3.75c
St. Paul	4.02c
Tulsa	4.65c
COLD ROLLED STRIP	
Boston, 0.100-in., 500 lb. lots	3.245c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.22c
Cleveland (b)	3.20c
Detroit	3.18c
New York‡(d)	3.36c
St. Louis	3.45c
TOOL STEELS	
(Applying on or east of Mississippi river; west of Mississippi 1c up)	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c
Uniform extras apply.	
BOLTS AND NUTS	
(100 pounds or over)	Discount
Chicago (a)	70
Cleveland	70
Detroit	70-10
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill. size and quantity extras; (d) Quantity base; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 in.; (j) shapes other than rounds, flats, fillet angles, 3.15c.

‡Domestic steel; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; † New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 9999 lbs. base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Feb. 20

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports		Continental Channel or North Sea ports, metric tons	
PIG IRON		£ s d	Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Silicon	$15.54	3 2 6	$13.66	1 13 0
Basic bessemer	15.54	3 2 6*	12.13	1 10 0
Hematite, Phos. .03-.05	16.19	3 5 0	13.15	3 11 0
SEMIFINISHED STEEL				
Billets	$27.39	5 10 0	$18.99	2 7 0
Wire rods, No. 5 gage	42.33	8 10 0	36.39	4 10 0
FINISHED STEEL				
Standard rails	$41.09	8 5 0	$44.47	5 10 0
Merchant bars	1.66c	7 10 0	1.13c to 1.18c	3 2 6 to 3 5 0
Structural shapes	1.66c	7 10 0	1.12c	3 1 6
Plates, †¼ in. or 5 mm.	1.80c	8 1 3	1.55c	4 5 0
Sheets, black, 24 gage or 0.5 mm.	2.16c	9 15 0	1.94c	5 6 0††
Sheets, gal., 24 gage, corr.	2.61c	11 15 0	2.29c	6 5 0
Bands and strips	1.88c	8 10 0	1.42c	4 0 0
Plain wire, base	2.05c	9 5 0	1.92c	5 5 0
Galvanized wire, base	2.39c	10 15 0	2.15c	5 17 6
Wire nails, base	2.66c	12 0 0	1.74c	4 15 0
Tin plate, box 108 lbs.	$ 4.67	0 18 9	.....	.....

British ferromanganese $75 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d $(43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

		£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$17.43	3 10 0(a)	$17.36	260	$13.11	385	$25.61	63
Basic bessemer pig iron	17.43	3 10 0(a)	12.69	190	11.92	350	28.25 (b)	69.50
Furnace coke	4.86	0 19 6	6.35	95	4.17	122	7.72	19
Billets	27.39	5 10 0	28.72	430	18.39	540	39.23	96.50
Standard rails	1.83c	8 5 0	2.02c	671	1.69c	1,100	2.43c	132
Merchant bars	1.86c	8 12 0	1.69c	560	.92c	600	2.02c	110
Structural shapes	1.95c	8 15 0	1.66c	550	.92c	600	1.97c	107
Plates, †¼-in. or 5 mm.	2.01c	9 1 3	2.12c	700	1.08c	700	2.33c	127
Sheets, black	2.45c	11 10 0§	1.81c	600‡	1.27c	825‡	2.65c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	2.95c	13 10 0	2.87c	950	2.31c	1,500	6.80c	370
Plain wire	2.05c	9 5 0	2.72c	900	1.77c	1,150	3.18c	173
Bands and strips	2.07c	9 7 0	1.97c	650	1.23c	800	2.33c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.

**Gold pound sterling carries a premium of 66.00 per cent over paper sterling.

Bars

Bar Prices, Page 70

Pittsburgh—Despite severe weather there is a remarkable stability to merchant bar demand. Although orders from the automotive industry are still at a depressed rate, more inquiries are being circulated.

Cleveland—Plain carbon steel bars are steady at 1.90c, base, Cleveland. While the price for second quarter had not been announced late last week, sellers generally anticipate it will be reaffirmed. Despite recent reports of concessions in nearby districts, the tone of the market here is firm. Demand from automobile forge shops has improved slightly.

Chicago—Steel bar demand still is below the average of the past several months, due entirely to reduced buying of automotive material. Specifications from miscellaneous users are steady, except in those instances where the weather has interfered with consumption. Farm implement plants are holding to active schedules which in most cases are in excess of those a year ago. Merchant bar prices are steady.

New York—Commercial steel bar prices are steady and the trade looks for reaffirmation of the 1.85c, Pittsburgh, price for second quarter.

Philadelphia—Buying of steel bars is slightly less than in January, with contracting for second quarter likely to provide the next important impetus to activity. Prices are steady.

Plates

Plate Prices, Page 70

Pittsburgh—Considerable interest is being shown by barge buyers. A downriver sand and gravel concern is seeking several barges for delivery by April 1 and may lease them. Standard Oil Co. of New Jersey wants several barges but is undecided on the design. Gulf Refining Co. will build a non-propelled tank barge. The price of 1.80c, base, Pittsburgh, is quoted unchanged for shipments over the balance of this quarter.

Cleveland—Largest plate orders are coming from railroads for car repairs and car building companies which have shared in recent awards. Nearly all the railroads have increased their repair work. Columbia Chemical Co., Barberton, O., is taking bids on tanks requiring 210 tons of plates.

Chicago—Prospective plate business is accumulating as a result of improved activity in railroad equipment. Several large tonnages also are pending for various tank and pipe projects. Among the largest of the latter is 9000 tons for a St. Louis water pipe line. Miscellaneous industrial tank work continues moderately active. Plate prices are well maintained.

Philadelphia—Plate prices are fairly steady at 1.90c, Coatesville, Pa., or 1.99½c, Philadelphia. Opening of books for second quarter may not develop until about the middle of March, according to some trade leaders. With the recent placing of over 20,000 tons by the Sun Shipbuilding & Dry Dock Co., Chester, Pa., the situation offers practically no important pending tonnages. The outlook for March is more encouraging.

New York—Transportation companies are specifying more freely for car repairs and thus aiding in consumption of steel plates. General demand for plates is fair, although without important tonnages. Railroad requirements are attracting most attention. Plates for the large United States liner have not been placed and much barge construction is still in a tentative stage.

San Francisco—Plate awards totaled 5335 tons and brought the ag-

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- Special Sections
- Alloy Steels

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gregate for the year to within 8000 tons of the total placed during 1935. To date 44,611 tons have been booked, compared with 8335 tons for the same period in 1935. Western Pipe & Steel Co. took 4400 tons for the 60-inch welded steel Crystal Springs pipe line No. 2, San Francisco, and 475 tons for a 36 and 44-inch welded steel line for the same city.

Seattle—No large projects involving plates are pending but warehouses report a good volume in small tonnages of all gages required in replacement and repairs and for miscellaneous tank jobs.

Contracts Placed

4400 tons, 60-inch welded steel pipe, Crystal Springs pipe line No. 2, San Francisco, to Western Pipe & Steel Co., San Francisco.

2000 tons, for riveted steel dredge, 155 x 70 x 12 feet, with 32 watertight compartments, for unstated eastern interests for South American delivery, to Treadwell Construction Co., Midland, Pa.

500 tons, two 180-foot steel oil barges for American Oil Co., Baltimore, to Nashville Bridge Co., Nashville, Tenn.

475 tons, 36 and 44-inch welded steel pipe, contract No. 80, San Francisco, to Western Pipe & Steel Co., San Francisco.

415 tons, two barges, Pan-American Petroleum & Transport Co., New York, to Nashville Bridge Co., Nashville, Tenn.

400 tons, two tanks, Alhambra, Calif., to Chicago Bridge & Iron Works, Chicago.

300 tons, four all-welded steel deck barges, 110 x 26 x 6½ feet, for Tennessee Valley authority, Knoxville, Tenn., to St. Louis Shipbuilding & Steel Co., St. Louis, at $6960 each.

110 tons, derrick barge, United States engineer office, Vicksburg, Miss., to Treadwell Construction Co., Midland, Pa.

Unstated tonnage, ferry barge for Tennessee Valley authority, Knoxville, Tenn., to Ingalls Iron Works Co., Birmingham, Ala.

Contracts Pending

9000 tons, water pipe line, St. Louis.

427 tons, ring beams and splice plates, Fort Peck, Mont., project; bids in to United States engineers, Kansas City, Mo.

390 tons, 20-inch welded steel pipe, contract No. 106, San Francisco; Montague Pipe & Steel Co., San Francisco, low.

300 tons, twin-screw oil burning lighthouse tender HOLLYHOCK, 175 x 35 x 14 feet; bids to federal bureau of lighthouses, Washington, March 11.

275 tons, two storage tanks, Sacramento, Calif.; bids opened.

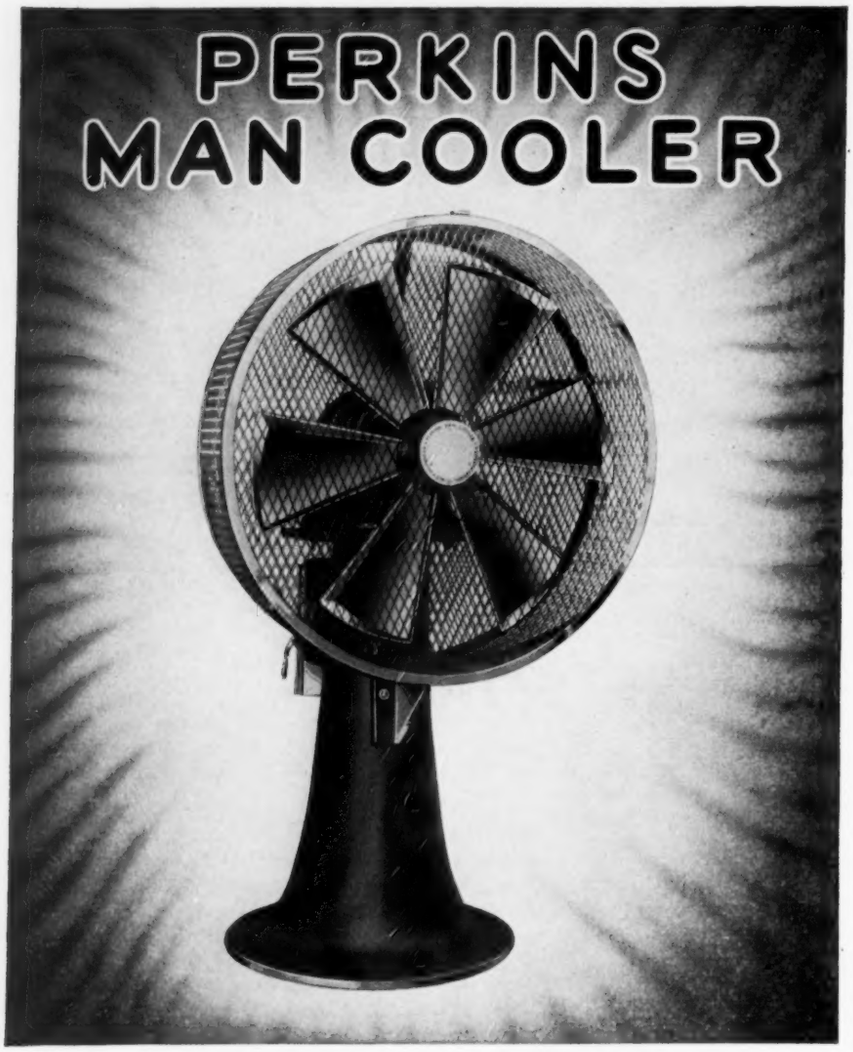
255 tons, steel sheeting for Fort Peck dam tunnels, Wiota, Mont. Youngstown Sheet & Tube Co., Youngstown, O., and Carnegie-Illinois Steel Corp., Pittsburgh, jointly low at $16,756.15, followed by American Rolling Mill Co., Middletown, O., $16,791.39, and Republic Steel Corp., Cleveland, $17,544.46.

210 tons, tanks, Columbia Chemical Co., Barberton, O.; bids being taken.

100 tons, steel tank and tower, Southgate, Calif.; Chicago Bridge & Iron Works, Chicago, low.

Unstated tonnage, two needle flats for federal engineers, Cincinnati; Marietta Mfg. Co., Point Pleasant, W. Va., low on riveted basis at $4160, and American Bridge Co., Pittsburgh, low on a welded basis at $4384.

Unstated tonnage, one non-propelled tank barge, for Gulf Refining Co., Pittsburgh.



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ENGINEERS AND MANUFACTURERS

Transportation

Track Material Prices, Page 71

Placing of 55,500 tons of rails and 825 freight cars by railroads in the past week shows activity of the carriers in getting their 1936 programs under way. Details of these rail and car purchases are given on page 77.

In addition mills and suppliers are booking orders steadily for materials for other cars previously placed with builders. Producers of track material in the Pittsburgh district have booked about 4000 tons from the New York Central. Carnegie-Illinois Steel Corp. shortly will roll 3000 tons of 50-pound rails for the Brazilian government. Material for the 3000 hopper and gondola cars for the Union and Bessemer & Lake Erie will be undertaken soon.

Missouri Pacific has been author-

ized by the federal court to buy 300 allsteel box cars for its subsidiary, the International-Great Northern, to be paid for out of revenues of the latter.

New York, New Haven & Hartford is expected in the market shortly for its freight car requirements, estimated to include 1500 open top and 500 box cars.

Car Orders Placed

Missouri Pacific, 300 steel box cars to unstated builder.
Northern Pacific, 250 stock cars, to own shops, Laurel, Mont.
Phillips Petroleum Co., Bartlesville, Okla., 10 tank cars, to General American Tank Car Corp., Chicago.
Shell Chemical Co., San Francisco, 15 tank cars, to General American Tank Car Corp., Chicago.
Union Refrigerator Transit Co., 250 steel refrigerator cars to General American Tank Car Corp., Chicago.

Locomotives Placed

Interoceanic Railway of Mexico, five locomotives, to American Locomotive Co., New York.
Union Pacific, 15 freight locomotives to American Locomotive Co., New York.

Rail Orders Placed

Gulf, Mobile & Northern, 3000 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Mobile & Ohio, 700 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
St. Louis-San Francisco, 17,800 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.
Western Maryland, 3000 tons, half each to Carnegie-Illinois Steel Corp., Pittsburgh, and Bethlehem Steel Corp., Bethlehem, Pa.
Western Pacific, 31,000 tons; 21,000 tons to Colorado Fuel & Iron Co., 10,000 tons to Columbia Steel Co., San Francisco.

Car Orders Pending

Denver & Salt Lake, 100 box cars.
Northern Pacific, 1000 cars; bids asked soon.

Locomotives Pending

Inland Steel Co., Chicago, three switch engines, bids asked.
Northern Pacific, twelve locomotives, bids asked soon.

Buses Booked

Pullman-Standard Car Mfg. Co., Chicago, 16 trackless trolley coaches for United Electric Railways, Providence, R. I.

Cold Finished

Cold Finished Prices, Page 71

Pittsburgh—The present market of 2.10c, base, Pittsburgh, for cold-drawn bars is likely to be extended unchanged for the second quarter. The delivered Detroit quotation of 2.30c, or eastern Michigan of 2.35c also probably will be extended. Other base prices are steady and without change at 2.15c, Cleveland, Chicago and Gary, Ind., and 2.20c, Buffalo. Buying over the past week is still in moderate proportion.

Sheets

Sheet Prices, Page 70

Pittsburgh—A quantity differential plan, similar to that in effect on carbon steel bars since August, 1935, is being considered, to stabilize price. Producers have not officially written down Pittsburgh base prices on either hot or cold-rolled sheets, but are making $3 a ton concessions in some districts, chiefly Detroit. Due to the fact that several automobile companies placed tonnage orders last week, plus the continued showing of miscellaneous buyers, February may equal January's volume of sheet specifications. Producers' operations were up 5 points last week to 55 per cent, and advances were recorded in the output of not only black sheets but galvanized and full finished. After many weeks' inactivity, job-

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MAGNETIC EQUIPMENT

bing mills picked up last week, to close to 50 per cent operations.

Cleveland—Heavier orders have been placed by automobile partsmakers, while demand from refrigerator and stove manufacturers have continued at a steady, and high average. Prices still are unsettled, with consumers in various lines bringing more pressure for concessions similar to those which were granted large automobile manufacturers. Certain mills have refused to go below 2.40c, base, Pittsburgh, for No. 24 hot rolled annealed, although confronted with lower quotations received by barrelmakers and others. Easiness in galvanized sheets, first noted in eastern markets, also has spread to this district, and lower prices have been met by sellers here.

Chicago—Sheet producers defer announcement of second quarter prices, with quotations for that period to be announced on the opening of books March 2. Some irregularity still prevails in this district, though quotations are relatively steady compared with the recent situation in Detroit. Business is well maintained, specifications from practically all important consumers except the automotive industry having been steady during the past several weeks. Improvement in automotive buying is confidently expected within the next two to three weeks.

New York—Prices on most grades of sheets are holding at a spread of $3 a ton. Opening of books for second quarter is expected momentarily and may result in re-establishing recent official prices. Some consumers expecting the market to firm up have placed larger orders.

Philadelphia—Concessions of at least $3 a ton are available on most grades of sheets for shipment by the end of March. Prices for second quarter are eagerly awaited, and may be announced this week. Efforts will be made by sellers to restore the market as soon as possible.

Buffalo—Sheet works in this district continue to operate at 75 per cent. Improved weather conditions are expected to bring larger specifications for automobile tonnage.

Cincinnati—Sheet specifications are lighter, steadiness in demand for refrigerators and stoves failing to offset continued lull in automotive needs. Production schedules are off 8 points to 72 per cent.

St. Louis—Sheet demand shows moderate improvement, both in new orders and specifications. Implement interests are accounting for larger tonnages.

Birmingham, Ala.—Sheet mill operations are steady. Improved demand is anticipated as spring approaches.

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Pipe

Pipe Prices, Page 71

Pittsburgh—Columbia Gas & Electric Co.'s 20 or 22-inch line, 285 miles long, appears to be an early project for award. Continental Oil Co., Ponca City, Okla., has authorized construction of a 44-mile line from Acadia Parish, La., to Lake Charles, La., also a gas line between the same points to supply the Mathieson Alkali Co. at Lake Charles. Pipe mills in this district are operating at about 50 per cent. Demand for lap-weld and butt-weld pipe, and seamless, is steady.

Chicago—While cast pipe producers continue to receive a fairly steady volume of business, individual orders are only moderate. Activity is restricted in the Central West by snow and low temperatures. Among the largest inquiries is 6000 tons for Keokuk, Iowa. St. Louis is the market for 9000 tons of steel pipe. Continental Oil Co. has authorized construction of a 44-mile line in Louisiana.

Eastern Texas Petroleum Co. has

awarded contract to the Apex Construction Co. to Lindeweld 55 miles of 8-inch pipe from Longview, Tex., to Rodessa, La. Phillips Petroleum Co., Bartlesville, Okla., has awarded contract to White Deere Pipe Line Co. to lay 40 miles of 2½ to 12-inch at Hobbs, N. Mex., of which 33 miles will be oxyacetylene welded.

New York—While considerable cast pipe tonnage is slated to come up for action over the next couple of months, the market now reflects no new awards of any importance. Prices continue firm on the basis of $43 per net ton, eastern foundries, for 6-inch class B.

Philadelphia—While commercial pipe tonnage is lagging locally, heavy specifications continue to come in from the Texas oil fields, with a district producer operating three shifts as a partial result.

Buffalo—Producers of pipe have increased their output 25 per cent, to stock up in anticipation of the best demand in recent years. While weather conditions have prevented construction or even preliminary work, it is believed that water line extension this year will be of very large size. The outlook for sales of pipe in nearby oil and gas regions is good.

Birmingham, Ala.—Shops on cast pressure pipe and fittings are active, and shipments are steady. Some fairly large orders have been booked, and others are in the offing. Valve and hydrant specialties are in good demand, and prospects are also bright with this branch of the industry.

San Francisco — United States Pipe & Foundry Co., Burlington, N. J., took 321 tons for Dos Palos, Calif., and 215 tons for Pearl Harbor, T. H., and is low on 717 tons of 10 to 16-inch, class E to H for San Francisco. Pacific States Cast Iron Pipe Co., Provo, Utah, took 178 tons of 6 to 12-inch for treasury department at San Francisco. Treasury department, Oakland, Calif., has opened bids for 173 tons of 18-inch.

Seattle—Interest in cast pipe is lacking, but several municipal projects are pending. United States engineer for the Fort Peck dam at Wista, Mont., opened bids Feb. 13 for 30,000 feet of standard black pipe. Bids will be opened March 25 at Washington, for construction of a proposed $200,000 water system at Pearl Harbor, Hawaii.

Cast Pipe Placed

670 tons, 4 and 6-inch, class 150, Oakland, Calif., to American Cast Iron Pipe Co., Birmingham, Ala.
321 tons, 4 to 8-inch, Dos Palos, Calif., to United States Pipe & Foundry Co., Burlington, N. J.
215 tons, 6 to 12-inch, specification 8128, Pearl Harbor, T. H., to United States Pipe & Foundry Co., Burlington, N. J.
178 tons, 6 to 12-inch, invitation 539, treasury department, San Francisco, to Pacific States Cast Iron Pipe Co., Provo, Utah.

Cast Pipe Pending

6000 tons, Keokuk, Iowa; bids Feb. 24.
944 tons, Pasadena, Calif.; bids opened.
717 tons, 10 to 16-inch, class E to H, San Francisco; United States Pipe & Foundry Co., Burlington, N. J., low.
200 tons, 6-inch, treasury department, San Diego, Calif.; bids opened.
173 tons, 18-inch, invitation 232, treasury department, Oakland, Calif.; bids opened.
125 tons, 2-inch, specification No. X-10, Los Angeles; Crane Co., Chicago, low.
Unstated tonnage, 6 and 8-inch, Carmel, N. Y.

Steel Pipe Pending

9000 tons, water line, St. Louis.
Unstated tonnage, 44-mile oil line in Louisiana for Continental Oil Co., Ponca City, Okla.

Strip Steel

Strip Prices, Page 71

Pittsburgh — No strip steel producer through last week had officially reduced prices on hot or cold-

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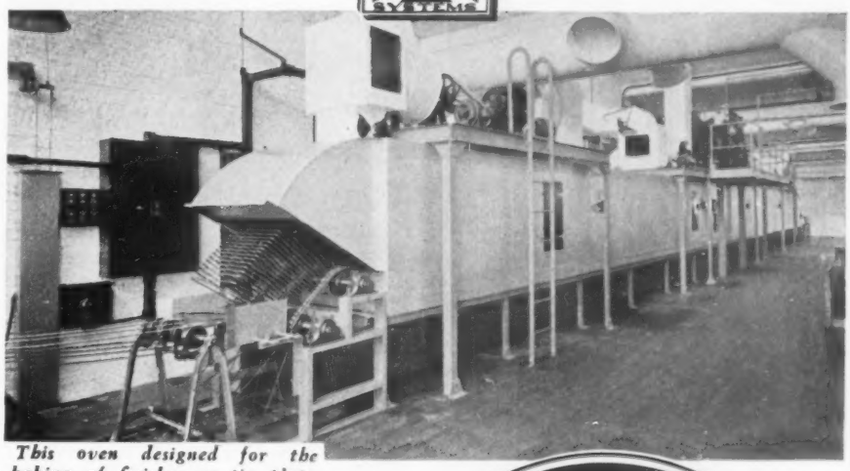

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rolled strip steel and 1.85c, Pittsburgh, on hot-rolled and 2.60c, Pittsburgh or Cleveland, for cold-rolled were quoted nominally. In many cases buyers have been granted concessions of $3 a ton but the likelihood favors a corrective move for second quarter. The market meanwhile ranges 1.70c to 1.85c. Among changes being considered is a quantity differential plan for both hot and cold-rolled strip steel. Orders for strip have fallen off sharply, although operations are slightly higher at about 45 per cent of capacity for the industry.

Cleveland—Automobile parts makers are specifying a little more liberally in anticipation of larger orders in March. Demand from hardware and other miscellaneous users is light.

Boston—Strip steel does not reflect the price shading reported from some other districts. Hot strip continues firm at 1.85c, base, Pittsburgh, and cold strip at 2.80c, base, Worcester, Mass. Demand has not yet recovered from the holiday lull.

Chicago — Strip steel demand is steady at a lower rate than 30 to 60 days ago. This recession, occasioned principally by lighter automotive requirements, is expected to be corrected by the middle of March through an upturn in motor car assemblies. Strip prices, which have been irregular lately, are expected to be reaffirmed for second quarter.

New York—Sellers of narrow strip are expected to announce second quarter prices soon, at levels prevailing before the recent weakness which has brought a spread of $3 per ton to current quotations.

Philadelphia — Prices of hot and cold-rolled narrow strip have eased off in line with sheet prices, with most buyers standing by, awaiting developments, particularly with respect to second quarter.

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110 YEARS' IRON- AND STEEL-MAKING EXPERIENCE

Wire

Wire Prices, Page 71

Pittsburgh — Corrective moves by producers as to prices on merchant wire products have not yet been made official and the market continues erratic. This is especially noticeable in certain southwestern districts. Manufacturing wire appears to be steady at 2.30c, base Pittsburgh on plain wire and 2.90c on spring wire.

Cleveland—Easiness in nail prices first noted in the South and Southeast has spread to other districts, and some concessions also are reported here on other wire products, mainly from distributors. The market is quieter.

Chicago—Second quarter prices on wire and wire products have not been announced, though it is expected that present quotations will be extended. Occasional shading is noted in prices of merchant products. While demand for manufacturers' wire remains fairly steady, there is no improvement in automotive buying. Jobbers' stocks generally are light and a gain in demand is in prospect with moderation in the weather.

Boston — Consumption of manufacturers' wire is at a high rate and prices are firm. Conditions are not so satisfactory in merchant products. Nails notably are weak. The usual price to jobbers is 2.40c, base, Pittsburgh, but as low as 2.10c or less has been developed on jobber business.

Semifinished

Semifinished Prices, Page 71

Buyers of sheet bars, billets and slabs in the open market still are not required to pay the $2 a ton advance, which producers announced several months ago and then postponed from time to time. Many, however,

are stocking up to as much as 50 per cent more than their normal inventories. Nonintegrated mills are protesting the increase, which probably will be more uniformly applied with the second quarter, because strip and sheet prices have declined. Common wire rods are firm and have been actively tested by representative sales at $40, Pittsburgh or Cleveland, and $42 for combination sizes.

Shapes

Structural Shape Prices, Page 70

New York—With the continuance of structural steel lettings in fair volume, demand for plain shapes continues at a good rate in the general metropolitan area. Many new projects are being planned, indicating a promising outlook for the first half of this year. Plain shapes continue 1.90c, Bethlehem, Pa., and this figure appears to be steady.

Pittsburgh—On March 9 bids will be closed for a 7000-ton state highway bridge at Middletown, Conn., the tonnage including 700 tons of eye bars. Bids will be asked in the near future on a 300-foot viaduct bridge over Oakland avenue, Sharon, Pa., for which plans are being completed. Plain structural shapes are unchanged at 1.80c, base, Pittsburgh.

Cleveland—Eight Ohio state projects requiring structural steel are scheduled for bids about March 17. They include 1200 tons for the Black river bridge, near Lorain, O., on which cost estimates have been raised for rebidding, 500 tons for a bridge in Cuyahoga county, and 550 tons in miscellaneous road and bridge work. Plain material prices are steady, but keen competition is noted in fabricated bids.

Chicago—Awards of more than 20,000 tons are the heaviest in many months. Largest bookings include 6500 tons for a city hall in Kansas City, Mo., and 6325 tons for ring bracing at the Fort Peck dam, Wiota, Mont. The new rod mill building for American Steel & Wire Co. at Joliet, Ill., will take about 2000 tons. Illinois takes bids March 3 on 2000 tons for an armory at Springfield, and 1017 tons for state bridges. Better operations for fabrication are in prospect for the next several months.

Philadelphia — Tonnage is lagging considerably but most fabricators feel that more favorable weather next month will bring out considerable work.

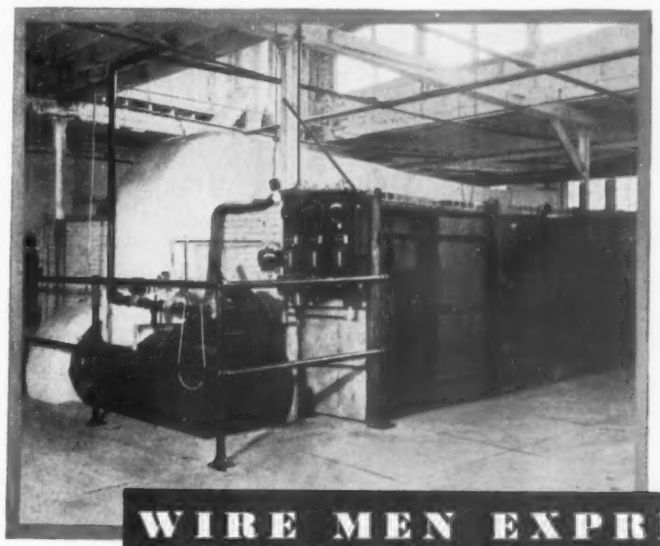
St. Louis—Cold weather continues to slow down construction operations, both on projects under way and at fabricating yards. Prospects continue bright for business during the next few months, but actual lettings and inquiries at the moment are small.

San Francisco—The largest structural letting in the week went to Judson-Pacific Co., 700 tons for a theater for Stanford University, California. To date this year 15,971 tons have been placed, compared with only 7636 tons for the corresponding period in 1935.

Seattle—Business pending is of fair proportions, some of it awaiting approval by federal officials.

Shape Awards Compared

	Tons
Week ended Feb. 24	30,697
Week ended Feb. 17	9,350
Week ended Feb. 10	17,093
This week, 1935	9,968
Weekly average, 1935	17,081
Weekly average, 1936	22,617
Weekly average, January	28,322
Total to date, 1935	108,097
Total to date, 1936	180,937



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Bids were opened Feb. 21 at Pullman, Wash., for a stadium for the state college, involving 425 tons.

Shape Contracts Placed

6500 tons, city hall, Kansas City, Mo., through Swenson Construction Co., Kansas City, general contractor, to Kansas City Structural Steel Co.

6325 tons, Fort Peck dam diversion ring bracing, Wiota, Mont., to Amer-Steel Co., East St. Louis, Ill.

3500 tons, federal reserve building, Washington, awarded through George A. Fuller Co., general contractor, that city, to Bethlehem Steel Corp., Bethlehem, Pa.; 600 tons of reinforcing bars also required.

3125 tons, building at Hudson and Varick streets, New York, to American Bridge Co., Pittsburgh, through Post & McCord, New York.

2000 tons, rod mill building, American Steel & Wire Co., Joliet, Ill., to American Bridge Co., Pittsburgh.

720 tons, state highway bridge, La Crosse, Wis., to Worden-Allen Co., Milwaukee.

700 tons, theater, Stanford University, California, to Judson-Pacific Co., San Francisco.

675 tons, overhead crossing, Oklahoma City, Okla., to J. B. Klein Iron Foundry Co., Oklahoma City.

610 tons, Dry Dock Savings institute, New York, to Ingalls Iron Works Co., Birmingham, Ala.

600 tons, state highway bridge, French Village, Ill., to St. Louis Structural Steel Co., East St. Louis, Ill.

575 tons, overhead crossing, South Milwaukee, Wis., to Worden-Allen Co., Milwaukee.

550 tons, state highway bridge, East St. Louis, Ill., to Midland Structural Steel Co., Cicero, Ill.

510 tons, water purification plant, Cincinnati, to Bethlehem Steel Corp., Bethlehem, Pa.

500 tons, consisting of a 330-ton state highway bridge, Saginaw, Mich., and a 170-ton state highway bridge, Highland Park, Mich., to R. C. Mahon Co., Detroit.

450 tons, theater, Tacoma, Wash., to Minneapolis-Moline Power Implement Co., Minneapolis.

355 tons, public school 207, Brooklyn, N. Y., to Harris Structural Steel Co., New York.

310 tons, transmission towers for Northern States Power Co., St. Paul, to American Bridge Co., Pittsburgh.

245 tons, girders, mid-town Hudson tunnel ventilation building, New York, to Lehigh Structural Steel Co., Allentown, Pa.

240 tons, Isaly Dairy building, Columbus, O., to C. E. Morris Co., Columbus.

200 tons, school, Penn township, Pennsylvania, to Ingalls Iron Works Co., Birmingham, Ala.

190 tons, state highway bridge, Orange county, New York, to Bethlehem Steel Corp., Bethlehem, Pa.

165 tons, Excelsior high school, Norwalk, Calif., to Pacific Iron & Steel Co., Los Angeles.

162 tons, bridge, Fremont county, Colorado, to unnamed interest.

160 tons, three railroad bridges, for Delaware, Lackawanna & Western railroad, to American Bridge Co., Pittsburgh.

155 tons, building alteration, 62 West 133rd street, New York, to Egleston Bros. & Co., Long Island City, New York, through procurement division, treasury department, New York.

145 tons, school auditorium, Johnson county, Kansas, to Kansas City Structural Steel Co., Kansas City, Mo.

145 tons, county home, Wycoming county, Pennsylvania, to Steel Fabricating Co., Milton, Pa.

130 tons, mill building, Climax Molybdenum Co., Climax, Colo., to Midwest Steel & Iron Works Co., Denver, Colo.

115 tons, bridge, Big Horn county, Wyoming, to American Bridge Co., Pittsburgh.

115 tons, building alteration, Zanesville, O., to Wise Foundry Machine & Supply Co., Zanesville.

115 tons, bridge, Franklin, Nebr., to Lincoln Steel Works, Lincoln, Nebr.

109 tons, storehouse, specifications 8003, Pearl Harbor, T. H., to Bethlehem Fabricators Inc., Bethlehem, Pa.

101 tons, state infirmary buildings, Elgin, Ill., to Duffin Iron Co., Chicago.

100 tons, tunnel ribs, metropolitan water district, Los Angeles, to Youngstown Steel Car Corp., Niles, O.

100 tons, hangar frame, Puget Sound, Wash., navy yard, and miscellaneous, to Isaacson Iron Works, Seattle.

Shape Contracts Pending

7000 tons, state highway bridge over Connecticut river, Middletown, Conn., including 700 tons of eye bars; bids March 9. Bridge consists of two 600-foot spans.

6014 tons, consisting of 4270 tons of ring beams and splice plates and 1744 tons of purlins and clip angles, steel excavation bracing for the

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DETROIT

Fort Peck tunnels, Wiota, Mont. American Bridge Co., Pittsburgh, low.
2000 tons, armory, Springfield, Ill.; bids March 3.
2000 tons, piling, Galveston, Tex.; bids in.
1300 tons, Livestock building, San Francisco; new bids March 10.
1017 tons, state bridges, Illinois; bids March 3.
800 tons, 37 bridges for Florida relief administration; bids taken Feb. 19.
800 tons, APW Paper Co. building, Albany, N. Y.; new bids asked.
720 tons, four state highway bridges, New York.
600 tons, Snake river bridge, Lorenzo, Idaho; general contract to Warren Construction Co., Portland, Oreg.
550 tons, Pennsylvania state bridge, Ridley Park; bids March 6.
500 tons, Santa Clara river bridge, Ventura county, Calif.; Consolidated Steel Corp., Los Angeles, low.
500 tons, state highway permanent bridge, Westchester county, New York; bids Feb. 25.
470 tons, express building, Syracuse, N. Y., for New York Central railroad.
425 tons, stadium, Washington state college, Pullman, Wash.; bids in.
400 tons, berth 155 Wilmington, Calif.; bids Feb. 19.
335 tons, alterations to pier No. 1, Boston, for navy department; bids taken Feb. 19.
334 tons, including 200 tons of miscellaneous steel, tunnels for Gila Valley project, Yuma, Ariz.; bids soon.
300 tons, postoffice, Santa Barbara, Calif.; Sarver & Zoss, Los Angeles, low on general contract.
255 tons, tunnel sheeting, Fort Peck dam, Wiota, Mont.; bids opened.
250 tons, Yankee stadium addition, New York.
250 tons, Triborough bridge buildings, New York; general contract to Cauldwell-Wingate Co., New York.
243 tons, Eagle mountain pumping plant, metropolitan water district, Los Angeles; bids March 13.
200 tons, monastery, Bronx, N. Y.; new bids asked.
200 tons, building, Smith Paper Co. Inc., Lee, Mass.
175 tons, Harlem health center, New York; general contract to Albert A. Lutz, New York.
160 tons, piling for government weir job, Silvana, Wash.; bids in.
100 tons, St. Gregory school, Chicago.

Tin Plate

Tin Plate Prices, Page 70

Pittsburgh—For the second successive week, the average of tin plate mill operations was about 65 per cent and apparently headed for higher levels with the approach of spring. Base box quotation of $5.25 on standard tin plate continues to be observed as the market. With several new interests in the container field expected to broaden their operations, many of the tin can producers are expecting keener competition in 1936.

Michigan Tool Co., Detroit, has appointed R. S. Armstrong & Bros. Co., Atlanta, Ga., its representative in the sale of its line of small tools in the state of Alabama, Georgia, South Carolina and southern North Carolina.

Reinforcing

Reinforcing Bar Prices, Page 71

New York—The past week has been the most active the reinforcing bar trade has seen in a long time, about 5000 tons being placed and considerable amount of other tonnage moving toward the closing stage. A firmer disposition of prices continues to be noted.

Pittsburgh—Bar producers submitted bids Feb. 21 on about 9500 tons of reinforcing steel bars, mainly ¼ and ½-inch rounds, for Fort Peck dam, Wiota, Mont. Bids were taken by the Kansas City, Mo., engineers. Pennsylvania has inquiries out for two state highway lettings at present, one for March 6 and the other, March 13. The official market of 2.05c, base, Pittsburgh, is prevailing on small lots of cut lengths, but the market is weak and variously quoted on attractive tonnages.

Chicago—Awards are in steady volume in spite of the fact that contractors have delayed considerably by the weather. Sewer work predominates building in this district.

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NEW YORK — CHICAGO — PHILADELPHIA — DETROIT — CLEVELAND

Rockford, Ill., has awarded 660 tons for sewer construction. Private building activity still is relatively quiet. Prices continue irregular.

Philadelphia — Reinforcing bar prices are steadier. The only outstanding award recently involved 300 tons for an indoor ice rink, for Hershey Lumber Supply Co., Hershey, Pa., placed with an unnamed seller.

San Francisco — Reinforcing bar awards in the week exceeded 7400 tons, bringing the total for the year to 52,060 tons, compared with only 21,018 tons in the same period last year. Concrete Engineering Co. took 338 tons for the central pumps reservoir, San Francisco.

Seattle—Inquiry for reinforcing materials has declined from a month ago but important tonnages still are pending, including more than 1000 tons for the University of Washington's chemistry building, and a state house addition at Olympia, Wash.

Reinforcing Steel Awards

4000 tons, Triboro bridge approach and paving, New York, to Jones & Laughlin Steel Corp., Pittsburgh, through Tully & Di Napoli Inc., Long Island City, N. Y.

2115 tons, Triborough bridge anchorage and paving, New York, to Concrete Steel Co., New York, through Albert A. Volk Inc., New York.

777 tons, county of Los Angeles, California, to unnamed interest.

760 tons, invitation 12-155, treasury department, San Diego, Calif., to unnamed interest.

750 tons, addition to Montgomery Ward & Co., building, Portland, Oreg., to Northwest Steel Rolling Mills, Seattle; Guy F. Atkinson & Co., Portland, general contractor.

560 tons, sewer, Rockford, Ill., to Concrete Engineering Co., Chicago.

550 tons, schedule 2335, treasury department, Los Angeles, to unnamed interest.

550 tons, federal reserve bank building, Washington, to Bethlehem Steel Corp., Bethlehem, Pa.

338 tons, central pumps reservoir, San Francisco, to Concrete Engineering Co., San Francisco.

250 tons, Sears, Roebuck & Co. store, Santa Monica boulevard, Los Angeles, to unnamed interest.

250 tons, regulative sewer, Bronx, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh, through Cleverock Nicholas Di Menna, New York.

200 tons, addition to high school, Van Nuys, Calif., to unnamed interest.

200 tons, Pennsylvania railroad bridge, Newark, N. J., to Igoe Bros. Co., Newark, through J. Rich Steers Inc., New York.

200 tons, plant building, Lever Bros., Hammond, Ind., to Concrete Steel Co., Chicago.

200 tons, Second avenue west and Queen Anne bridges, Seattle, to Northwest Steel Rolling Mills, Seattle; General Construction Co. and A. W. Quist & Co., general contractors.

200 tons, stadium and Industrial Arts building, Teachers college, Tempe, Ariz., to unnamed interest.

180 tons, schedule 991, treasury department, Los Angeles, to unnamed interest.

180 tons, sewer, Queens, N. Y., to Jones & Laughlin Steel Corp., Pittsburgh, through DeSalvo Contracting Co., Queens.

180 tons, invitation 12/214, treasury department, San Diego, to unnamed interest.

170 tons, invitation 801, 75-inch reinforced concrete pipe, treasury department, San Francisco, to Columbia Steel Co., San Francisco.

151 tons, highway work in Shoshone and Power counties, Idaho, to unnamed interests.

125 tons, Excelsior high school, Norwalk, Calif., to unnamed interest.

100 tons, laundry building, state hos-

Behind the Scenes with STEEL

Onward, Upward

LATEST word on the Kurly Klip question (if you are still interested) is that the Haggard & Marcusson Co. of Chicago, manufacturer of Tiger Brand (probably for Princeton men) bed springs of coiled, flattened wire, has been using the paper clips to advertise the construction of the springs. It seems the company practically sprays visitors to its booth in the Merchandise Mart with these clips. Furthermore, we are told the crooning Bing Crosby, in a recent picture, wears one of the clips in his lapel. Why? Don't ask us. Possibly because he couldn't get it fastened on some papers.

* * *

Number, Please?

CHARLES M. SCHWAB celebrated his 74th birthday last week and on the occasion received "newshawks" who were anxious to get the veteran's views on current questions. Unfortunately we were not there, but learned details second hand through the omniscient "March of Time" (ah there, Remington-Rand).

It seems that in the midst of his reflections on topics of the day, Bethlehem Steel's chairman was interrupted by the ring of a telephone. He then became fluttery and confessed it was pretty tough figuring out which of his many 'phones was the one to answer. However, a helpful secretary entered at this point and suggested the "third one from the left" which, as it turned out, was right.

What bothers us is why Mr. Schwab has need of so many telephones. And just how many *does* he have? And does he always have to summon his

secretary to identify each ring? Or has he a secretary for each 'phone?

The office we inhabit is equipped with five or six telephones (we haven't counted them lately) and until recently it was a real problem to figure out your own ring. Occassionally about four people would rush for one 'phone, which usually resulted in a dull crunch of body hitting body, and body hitting floor. We came in second a number of times, so we know.

But the telephone company fixed things up. Everyone has his own ring now, some a series of short, staccato tinks, others low, stentorous buzzes. Sounds like the house of a thousand bells. The telephone is a great invention, though, we think.

Getting back to Mr. Schwab, maybe our good friend, Bethlehem's John Long, could tell us something about the telephone situation on the veteran steelmaster's desk. Undoubtedly many readers would like to know more about this.

* * *

Close

STEELMAKING operations for January were forecast by the American Iron and Steel institute as 49.14 per cent. Reports to the institute at the end of the month showed the rate actually to have been 51.18 per cent. Averaging STEEL'S weekly reports on operating rates gives a figure of 50.80 per cent, only 0.38 per cent deviation. This month the editors hope to do a little better.

* * *

News from Home

ONE of the Penton editors turned over to this department a recent copy of his home-town gazette, the Plymouth, Ind., *Daily Pilot*. (We are pediculous around this office with Indiana indigents—no poets though.) Well, on page one of this sheet is a story bearing the headline: "34 Are Lost as Winds Shatter Pacific Ocean." Naturally we read on, expecting to see comment on the "sea being smooth as glass" before being struck by this "shattering wind." We were wrong, as usual, though; just a little hurricane or something.

* * *

Add Coincidences

WE DON'T know whether or not you can make anything out of the fact that Mr. H. H. Peek is president of the Lookout Boiler & Mfg. Co., Chattanooga, Tenn., but at least you can't say we didn't let you know about it.

—SHRDLU

Concrete Awards Compared

	Tons
Week ended Feb. 24	10,542
Week ended Feb. 17	1,979
Week ended Feb. 10	3,162
This week, 1935	13,776
Weekly average, 1935	6,862
Weekly average, 1936	9,763
Weekly average, January	9,556
Total to date, 1935	42,897
Total to date, 1936	78,106

pital, Camarillo, Calif., to unnamed interest.
100 tons, warehouse, 107 Rose street, Los Angeles, to unnamed interest.
100 tons, school buildings, El Segundo, Calif., to unnamed interest.
100 tons, Ynez school, Alhambra, Calif., to unnamed interest.
100 tons, sewer, Rockford, Ill., to W. J. Holliday & Co., Hammond, Ind.
100 tons, Sixty-ninth street terminal of Philadelphia & West Chester Transit Co., Philadelphia, to Bethlehem Steel Corp., Bethlehem, Pa.

Reinforcing Steel Pending

1567 tons, emergency shafts, Fort Peck dam, Wiota, Mont.; bids opened.
1060 tons, Eagle mountain pumping plant, metropolitan water district, Los Angeles; bids March 13.
920 tons, reinforcing bars, bridge over Connecticut river, Middletown, Conn.; bids March 9.
700 tons, two reinforced concrete storage tanks, Sacramento, Calif.; bids Feb. 20.
536 tons, New Jersey highway bridge, route 6, section 7; H. C. Lewis, Newark, N. J., low.
490 tons, Motor Vehicle building, Sacramento, Calif.; general contract to Barrett & Hilp, San Francisco.
212 tons, shop for George Washington high school, San Francisco; general contract to Anderson & Rowe, San Francisco.
200 tons, ward building, state hospital, Norwalk, Calif.; L. F. Dow, Los Angeles, low on general contract.
150 tons, postoffice, Santa Barbara, Calif.; general contract to Sarver & Zoss, San Diego.
140 tons, two bridges, route 6, section 7, New Jersey; James P. Burns, Dumont, N. J., general contractor.
125 tons, berth 155, Wilmington, Calif.; bids Feb. 19.

Pig Iron

Pig Iron Prices, Page 72

Pittsburgh—Prices are being extended into the second quarter on an unchanged basis, namely $19.50 for No. 2 foundry, malleable and other foundry grades, $19 for basic, and $20 for bessemer. Most melters are buying in small lots, and shipments are below those of the first three weeks in January.

Cleveland—Producers in this district will open books for first quarter at unchanged prices. Melters still have considerable tonnage acquired or ordered before Jan. 1, and new sales are light. Consumption by manufacturers of heating equipment continues heavy.

Chicago—Prices are expected to be extended into second quarter. Books for the period open next month, and a pick up in buying is in prospect. Spot business has been increasing, as accumulated stocks are being reduced. Shipments show little change from the January rate, but likely will be heavier next month.

Boston—Pig iron melt appears to have been reduced in the past few weeks, due to difficulties arising from severe weather. Current buying is confined to small lots for spot shipment. Work on relining the furnace of Mystic Iron Works, Everett, Mass., continues with a view to blowing it in about April 1.

New York—Daily tonnage so far this month has averaged a shade better than in January, and more substantial improvement is expected next month. There has been an increase in melt, which should call for the replenishment of stocks at some plants soon. Current orders are confined to small lots. Prices are steady.

Philadelphia—Pig iron sellers are expected to open books shortly for the second quarter and will extend prices. Tonnage is spotty, with consumers still drawing on stocks for bulk of requirements.

Buffalo—February has been a disappointing month for local sellers. The dull period has given producers an opportunity to round out their stocks. Shipments to the eastern trade will be resumed by rail in March, both for storage and direct to consumers.

Cincinnati — Shipments show steady improvement, with most melt-

PRETTY poor economy to make expert machine hands struggle with heavy loads! It tires workmen—takes too long—costs too much—slows up production of men and machines. The P & H Zip-Lift brings you a new and better method for floor-to-floor handling in machine shops—turns waste time into profit.

Production went up and costs went down when this Zip-Lift jib crane was set between two lathes. With simple push-buttons, operators handled heavy shafts on and off the chuck in less than half the time—saved an average of $2.00 per day. The Zip-Lift paid for itself in 80 days.

Easier to install, to operate, to own—the Zip-Lift will save money at many points around your shop. Ask us for suggestions about "spot handling."

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ZIP-LIFT

STOPS WASTE WITH "SPOT HANDLING"

ers, either on new purchases or specifications against contract, pressing for prompt delivery. Current buying is in small lots, at firm prices. With old contracts being steadily fulfilled, buying improvement is considered assured.

St. Louis—The market is quiet, and severe weather continues to interfere with operations at numerous plants. A favorable development was the settlement last week of the strike of enamel workers in the Belleville area, which cut heavily into the district melt.

Birmingham, Ala.—Buying is confined to small lots. Twelve blast furnaces are active and one furnace is to be overhauled and probably relined for future use. The base price, $15.50, for No. 2 foundry, is firm.

Toronto, Ont.—Demand continues to expand, and sales last week topped 1200 tons. Inquiries are being received, and further improvement is looked for early in the spring. The daily melt is holding in excess of 50 per cent. Four stacks are operating. Prices are unchanged.

Hobart Brothers Co., Troy, O., has appointed J. C. Gowing Welding Equipment & Supply Co., Jim Gowing manager, Laura and Regent streets, Huntington Park, Calif., exclusive distributor for its electric arc welders in southern California.

Scrap

Scrap Prices, Page 73

Pittsburgh — In the most pronounced sellers' scrap market in five years no sales into consumption were reported last week because brokers will not go short even at $16 for No. 1 steel and consumers here have not yet paid better than $15.25. Except for railroad grades, the market appears to be temporarily in an impasse. Remarkable strength to the Youngstown market is creating a novelty of taking a few small lots of machine shop turnings away from the Pittsburgh district proper.

Chicago—Scrap prices have soared here under the influence of active bidding by brokers and dealers, occasioned in a large measure by unfavorable weather. No. 1 heavy melting steel has been advanced 75 cents to $14.50 to $15, with railroad material bringing even higher prices. Practically all other grades are up 25 cents to $1. Mill buying is quiet and the trade is wondering what effect moderation of weather will have upon scrap prices.

Boston — Movement of iron and steel scrap is almost at a standstill owing to severe weather but consuming plants generally have backlogs to care for current requirements. Only one price change has developed, an increase in dealers' dock price on No. 1 heavy melting steel for export, which now ranges from $10.50 to $10.75.

New York—Several sales of No. 1 heavy melting steel at $16, delivered, Pittsburgh, have further strengthened the tone in the New York market. Whereas $9.50 f.o.b. cars, New York, had been an exceptional dealers' buying price, this figure now is being done more frequently. While the current range on this grade is $9 to $9.50, the average is toward the top. Eastern Pennsylvania steel mills in most cases have comparatively little scrap on hand.

Philadelphia—Cold and snow, interfering with delivery of scrap, have caused further advances in price as dealers seek material for contracts. Substantial premiums have been paid in many cases. While these are expected to disappear with normal weather, demand is such as to cause prices to strengthen to offset part of this situation. About 9000 tons of scrap is tied up in barges frozen in on the Delaware river.

Buffalo—Scrap continues to establish new highs as specialties are sold in good sized lots. Rails, stove plate, cast and malleable are bringing the best prices in recent years, with tonnage scarce for Buffalo delivery.

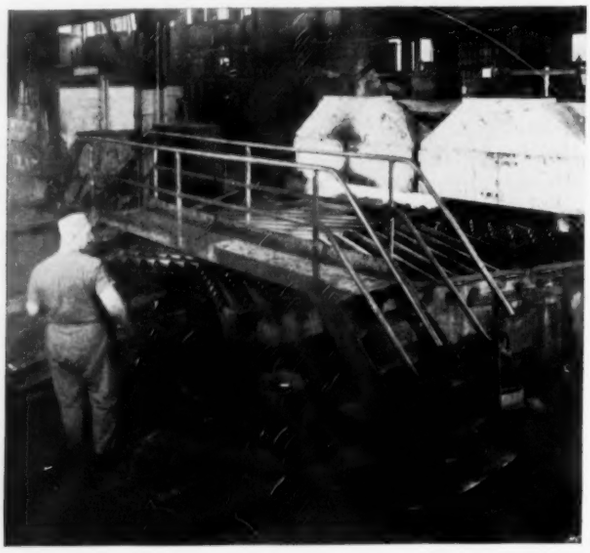
Dealers are shipping material to other melting centers in the absence of acceptable offers for heavy melting steel for local delivery.

Detroit — Because of dwindling scrap shipments from automobile plants and strong demand both locally and for Youngstown and Pittsburgh shipment, the market on open-hearth grades advanced 50 cents a ton last week. Similar advances have been made in blast furnace borings and turnings, low phos plate scrap and new No. 1 busheling.

Cincinnati—Bids on recent railroad lists, only a few of the items coming into this district, help to prolong strength in the iron and steel scrap market. Bids were generally higher than in January.

Birmingham, Ala. — Consumption of iron and steel scrap is somewhat improved but purchasing is in small lots for early delivery. Quotations are firm with heavy melting steel holding at $9.50 to $11.

St. Louis — Though melters are still holding aloof from the market,



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MATHEWS CONVEYER COMPANY

San Francisco, Calif. ELLWOOD CITY, PENNA. Port Hope, Ont., Can.

iron and steel scrap prices continue to soar, all active grades attaining new highs on the present upward movement. Dealer activity and scarcity, which on some grades borders on acute, are the chief elements in the strength.

Seattle—The market has regained some of the ground lost last month, an advance of 25 to 50 cents bringing prices up to $10 to $10.25 for No. 1 melting and to about $11.25 for rails. The Oriental market is again ready to buy but is unwilling to meet prices of exporters. The local market is short of stocks, which have been reduced in the last 60 days.

Toronto, Ont.—Severe weather has interferred with iron and steel scrap shipments but dealers are getting supplies through to melters, while deliveries against contract, where supplies are not urgently needed, are being delayed.

Warehouse

Warehouse Prices, Page 74

Pittsburgh — February will be a surprisingly good month for district jobbers, as total shipments and specifications appear to equal those of January. No change has occurred in prices, except nails which jobbers now quote at $2.60 and $2.50 per keg, for city and country shipment, respectively.

Chicago—Sales are well maintained, despite the light demand for materials for outdoor work. Severe weather still is interfering with shipments, but business so far this month is about equal to that of the corresponding January period.

Boston—Sales are averaging considerably less than in January. Prices are unchanged. Jobbers continue handicapped by competition in imported bars, shapes and reinforcing bars.

New York—Weakness has developed in another quarter of the iron and steel warehouse market here. Some jobbers are quoting 70 and 10 off the list on bolts and nuts. Others refuse to meet this figure and hold to 65 and 10 off.

Jobbers' shipments of rolled steel products are at about the same rate as in January.

Philadelphia — Jobbing demand this month is slightly under the daily rate of January, but open weather will bring improvement.

Detroit—A vast amount of potential business doubtless will be released with open weather in this district. In the meantime, shipments are keeping pace with those recorded in January. Last week Detroit jobbers reduced common and cement-coated nails to $2.70 per keg from $3.05. Other prices are unchanged.

Cincinnati—Warehouse business is featureless, with disposition to blame weather conditions. Business remains better than in February, 1935.

St. Louis—Distribution of iron and steel is still hampered by bad weather, and sales to date have not made a favorable showing. Railroad buying holds up well. Advance ordering by country distributors of wire and wire products, sheets and other goods has been below expectations. Prices are firm.

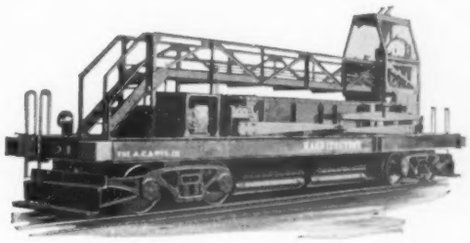
Seattle—Demand is slow, due largely to severe weather. Buying consists of small lots, with sheets, bars and all gages of plates leading the list.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 71

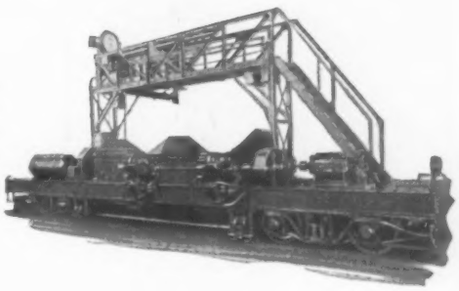
Bids on 586,000 pounds of bolts with hexagon heads and nuts to Kansas City army engineers ranged from 5.7c, submitted by R. C. Mahon Co., Detroit, and Duffin Iron Co., Chicago, to 6½c by American Bridge Co., Pittsburgh, and Commercial Shearing & Stamping Co., Youngstown,

ATLAS SCALE CARS



20 Ton — Double Compartment Scale Car. Journals provided with self aligning anti-friction bearings. Equipped with Atlas Indicator and Recorder.

20 Ton Two Compartment Scale Car with Orr Bin Gate Operating Mechanism. Anti-friction bearings. Equipped with Atlas Indicating and Recording Mechanism.



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Coke Oven Equipment

Pushers and Levelers—Coal Charging Cars—Door Handling Machines — Coke Quenching Cars.

Also Atlas Patented Indicating and Recording Mechanism for Weighing Scales.

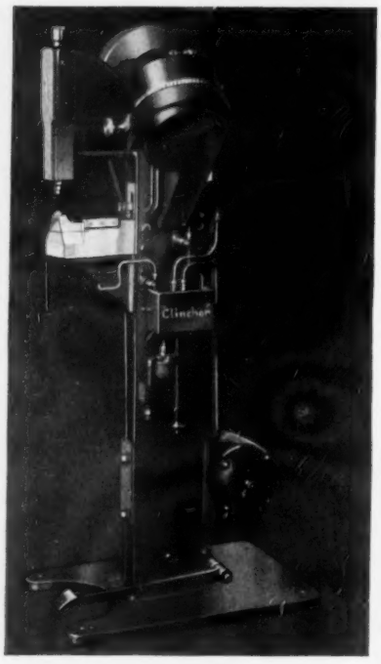
THE ATLAS CAR & MFG. CO.

Engineers *Manufacturers*

CLEVELAND, OHIO

O. The fifth bidder was Bethlehem Steel Corp., Bethlehem, Pa., which bid 6c. American Bridge Co., Pittsburgh, submitted the low aggregate bid for the bolts and steel excavation bracing for the Fort Peck dam tunnels, Wiota, Mont., which require 12,331,000 pounds of ring beams, splice plates, purlins and clip angles.

Railroad and farm implement manufacturers are taking more bolts, nuts and rivets and demand is somewhat better from miscellaneous sources. Jobbers are buying lightly. Quotations are fairly steady at 70-10-5 off for small and 70-10 off on large bolts and nuts, with rivets at 2.90c, Pittsburgh or Cleveland; 3.00c, Chicago.



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London S. W. 1. England

Steel in Europe

Foreign Steel Prices, Page 74

London—(*By Radio*)—Shortage in pig iron continues in Great Britain, deliveries are restricted, exports of iron have stopped and French pig iron is being imported. Prices of hematite have been further advanced. Semifinished steel producers are fully booked and imports of this and finished forms are increasing. The steel market is fully active with works at capacity and exports are expanding.

Imports of steel and iron products in January were 119,917 gross tons, a gain of 6924 tons over December. Exports in January were 164,772 tons, 25,536 tons less than in December.

The Continent reports increased volume of exports, especially semifinished steel to England and general steel products to India and the Far East. Belgian domestic prices have been increased.

Metallurgical Coke

Coke Prices, Page 71

Coke and coal from western Pennsylvania mines are being shipped in some quantity to the Chicago district and points farther west, in view of present conditions which find a relative shortage of supplies in those districts. Most of the activity is in domestic coal and coke, with metallurgical coke only sharing the improvement to a degree.

The market on standard foundry coke is quoted $4.25, f.o.b., Connellsville, Pa., ovens, per net ton, but premium foundry is easier at $5.50 due to competition of cheaper fuels.

Nonferrous Metals

Nonferrous Metal Prices, Page 72

New York—Outstanding feature of the major nonferrous metals last week was the general increase in sales over the previous period accompanied by a stronger price tone. Tin and antimony advanced to higher levels but other markets held firm.

Lead—Demand improved somewhat and this trend is expected to be accelerated during the final week of the month. The lead market continued strong with all leading sellers again quoting 4.35c, East St. Louis.

Copper—Buying spurted as several sellers advanced asking prices to 9.50c, Connecticut, for electrolytic. Metal was still available in two or three directions, however, at the 9.25-cent level and all business was transacted on that basis. At the close of the week it was uncertain which level would become definitely established.

Zinc—Shipments were maintained at an active pace and unfilled orders on sellers' books were reduced further. Heavy potential buying overhangs the market and may come in with a rush if prices appear definitely on an upswing. Prime western held unchanged at 4.85c, East St. Louis. Relatively low London prices have checked so far any advance here but they worked higher during the latter part of the week.

Tin—Straits tin prices rose steadily during the week, reflecting a stronger tone in London. Strength in the market was based chiefly on the 5-point cut in quotas to 85 per cent of standard tonnages. Consumer buying interest was light but spot closed around the 48-cent level.

Antimony—Spot Chinese and American metal advanced ⅜-cent to 13.25c, New York. Only moderate buying was reported here.

Equipment

Pittsburgh—Steel Industries Engineering Corp., here has received an order for a single screw electric clay gun from Wisconsin Steel Works, Chicago, division of International Harvester Co. This is the second gun supplied to this customer. Allegheny Steel Co. is working on the installation of new soaking pits and annealing furnace equipment in connection with the improvement program going on at the Brackenridge, Pa., works for some time. Part of this program has been to roll large ingots in one operation to 30-inch sheet bars, compared with the previous method of rolling smaller ingots into 8-inch sheet bars.

Chicago—Inquiries for various types of equipment, including machine tools, are increasing, but sales generally lack improvement. Machine tool sellers blame weather conditions for quietness in new business, but see better buying soon as a result of recent gains in inquiries. Used machinery dealers, on the other hand, have not found it necessary to blame the weather for slowing down their business, since they are enjoying steady demand for used and rebuilt items.

Seattle—Logging and lumber are active, especially in British Columbia, and equipment used in those industries is in good demand. Mining and dredging machinery is showing more activity as the season advances. Dealers in pumping equipment report a good turnover.

Construction and Enterprise

Ohio

CINCINNATI — City, Charles E. Lex Jr. purchasing agent, will ask bids Feb. 25 for fabricating and assembling steel metal for the department of public works, division of maintenance. Bids will be taken on the same date for ornamental iron and metal for the department of utilities, division of airports.

CINCINNATI — City, C. A. Dykstra city manager and Charles E. Lex Jr. purchasing agent, room 143, City hall, will ask bids March 25 for reconstructing the existing filtration building and head house and installing new additional filters, pipelines, etc. Program includes 900 tons of reinforcing steel, 550 tons of structural steel and iron work, and miscellaneous cast iron pipe and fittings. A PWA project.

CLEVELAND — Denning Mfg. Co., 1777 East Eighty-seventh street, F. W. Denning secretary, has been incorporated, and will concentrate on the production of dies and tools.

CLEVELAND—Hydraulic Equipment Co., 1226 East 152nd street, Hall Kirkham president, has been incorporated to manufacture equipment for truck lifts, road machinery, snow plows and the like.

CLEVELAND — Clark Controller Co., 1146 East 152nd street, has let the general contract for a second story addition to completely cover its present office space, and a partial addition over the factory. Work has started, to be completed about April 15, at an estimated cost of $25,000.

CLEVELAND — E. G. Hoefler, architect, is preparing plans for the construction of a $50,000 factory and office building for the Allied Printing & Bindery Machinery Inc., 1975 East Sixty-fifth street, to be constructed on Perkins avenue northeast.

CLEVELAND — Cuyahoga county commissioners, George H. Stahler clerk, new courthouse, Cleveland, are taking bids March 3 to furnish and deliver one gasoline engine-powered crawler type crane with 40-foot boom and clam shell bucket. Estimated cost $10,000, less trade in on model TU Brown hoist crane No. 10252.

CLEVELAND — A 1-story brick and steel building, providing 38,000 square feet additional for manufacturing purposes, will be erected by the Austin Co., 16112 Euclid avenue, Cleveland, for the Iron Fireman Mfg. Co., 3170 West 106th street. The $100,000 job is to be completed in approximately 80 days. T. H. Banfield is president.

CLYDE, O. — Village, James J. Freeborn mayor, and W. C. Kammerer and associates, 823 Prospect avenue, Cleveland, consulting engineer, may take bids soon for improvements to the Clyde light plant, to include a 750 kilowatt turbo-generator, cooling tower, condenser, new building and other equipment. Cost will be $60,000.

CONVOY, O. — Village, J. S. Redlinger mayor, T. A. Kreischer clerk, have made preliminary plans for waterworks and sanitary and storm sewers. George Champe and associates, Nicholas building, Toledo, O., are consulting engineers.

EAST CANTON, O. — Village, has prepared plans for a $57,000 waterworks system, and bids will be opened Feb. 29. Roscoe Rice, First National bank building, Canton, O., is consulting engineer.

EAST CLEVELAND, O. — City of East Cleveland, Charles A. Carran, city manager, will take bids Feb. 25 for furnishing and delivering one air compressor.

MANTUA, O. — Village, Councilman C. P. Briggs, has studied possibility of installing a municipal electric light and power plant.

MIDDLETOWN, O. — City, Walter J. Braun city manager L. P. Diefenbach city engineer, room 311 City building, is taking bids Feb. 27 for erection of new metal stack to replace two others at waterworks pumping station.

NEVADA, O. — Village, O. M. Coons mayor, Floyd Browne, Marion Brick & Cement building, consulting engineer, will take bids March 17 for pumping and iron removal equipment for the waterworks. Bids of Dec. 10 rejected.

YOUNGSTOWN, O. — Republic Steel Corp., Cleveland, will make improvements on the largest of its three electric welding pipe mills, here. The middle-sized mill was improved last year at a cost of $750,000, involving a change in the shaping rolls and machinery. Similar improvements will be applied to the larger mill.

Michigan

DETROIT — Minnesota Mining & Mfg. Co., St. Paul, manufacturer of abrasives, will establish a branch factory here for the manufacture of rubber cement, a new product developed for use in making all-steel automobile bodies. A 3-acre site and a building formerly used by the Studebaker Corp., with 322,000 square feet of floor space, has been acquired and will be immediately equipped with machinery and equipment.

DETROIT — Storehouse of the Chrysler-De Soto plant, 12200 East Jefferson avenue, was recently damaged by explosion and fire.

JACKSON, MICH. — Plant of Acme Industries was badly damaged by an explosion, Feb. 7. The company manufactures refrigerator coils, condensers, and evaporators.

Indiana

PERU, IND.—More than 100 power machines will be installed in an enlargement program of the Peru plant of the McLoughlin Mfg. Co., maker of underwear and other clothing. Head offices are at 552 Consolidated building, Indianapolis.

KOKOMO, IND.—Continental Steel Corp. is contemplating installation of new continuous wire-drawing equipment in revamping the Kokomo wire division. Installation of a 3-high breakdown mill and an additional pair furnace at Canton, O., is being considered. The sheet mill and warehouse buildings at Kokomo are being enlarged, and later two continuous sheet pack and one continuous pair furnace and a 3-high breakdown mill will be installed.

Connecticut

BRIDGEPORT, CONN. — Casco Products Corp., 1333 Railroad avenue, plans installation of electrical power equipment in the new addition to its automotive products manufacturing plant, at a cost of $85,000. Fletcher-Thompson Inc., Fairfield, Conn., is architect and engineer.

HARTFORD, CONN. — City, G. W.

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Pacific Coast Rep.: F. Somers Peterson Co., 57 California St., San Francisco, Cal.

Callahan director of project and C. A. Nott engineer, plans expending $22,000 for grading equipment, including graders, loaders, etc., for airport improvements at Brainard field.

Massachusetts

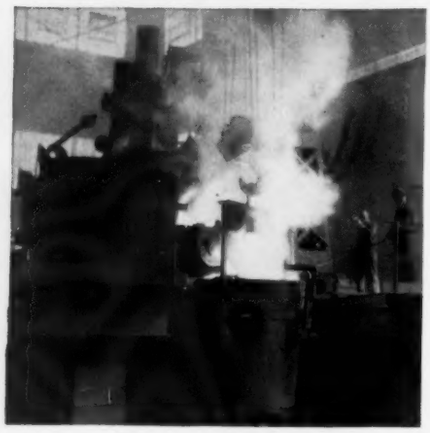
MALDEN, MASS.—Continental Can Co., 100 East Forty-second street, New York, is planning for the construction of a plant here, to cost in excess of $100,000. J. Fedasky, 100 East Forty-second street, New York, is in charge.

SALEM, MASS.—Hygrade Sylvania Corp., Boston street, is making plans for the construction of a multi-story plant on Loring avenue, South Salem, for the manufacture of radio tubes, at a cost of $250,000. The present plant will be used exclusively for incandescent lamp production. Lockwood & Greene Engineering Inc., 40 Central street, Boston, is architect and engineer.

NF

BASIC ELECTRIC STEEL

FORGINGS



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NATIONAL FORGE AND ORDNANCE COMPANY

IRVINE, WARREN COUNTY, PENNA.

New Hampshire

HINSDALE, N. H. — White-Washburne Co. Inc., 1 Main street, is having preliminary plans made up by McClintock & Craig, 458 Bridge street, Springfield, Mass., architect, for the construction of a brick manufacturing plant, to cost $80,000.

HINSDALE, N. H.—Cheshire Paper Co., Main street, H. S. Garfield vice president, is having preliminary plans made up by McClintock & Craig, 458 Bridge street, Springfield, Mass., architect, for the rebuilding of its paper mill recently destroyed by fire. Cost will exceed $100,000.

HINSDALE, N. H.—Hinsdale Paper Mfg. Co., L. D. Stearns, treasurer, plans replacing its paper manufacturing machinery recently damaged by fire.

Pennsylvania

CONWAY, PA.—Pennsylvania railroad, Philadelphia, has placed a contract with John F. Casey Co., Pittsburgh, for reconstruction of its river rail terminal here. Sheet steel piling will be driven and foundations constructed for a new loading and unloading crane.

PHILADELPHIA—Crown Cork & Seal Co., 60 East Forty-second street, New York, plans to construct a plant here, to cost $3,000,000.

PITTSBURGH—Northside Wagon Co. plant, West North avenue, was damaged by fire recently.

PITTSBURGH—Mayer Body Corp., 6459 Frankstown avenue, was recently damaged by fire.

UNIONTOWN, PA.—William E. Dudley, owner of the Dudley Electric & Machine Co. plant, which was damaged by fire, will rebuild the plant immediately.

WILLIAMSPORT, PA. — Machinery and equipment for the manufacture of staves, barrels and kegs is to be installed in the former Crandall-Bennett-Porter Co. plant in Montoursville, Pa. The plant, comprising 60,000 square feet of floor space, has been acquired by the Lycoming Barrel Corp., Williamsport.

New York

PERRY, N. Y.—Construction of a city municipal light and power plant, at a cost of $230,000, has been recommended by special engineers appointed to consider the project. A bond issue is proposed to finance construction.

NEW YORK — City, board of education, 500 Park avenue, William C. Martin, Flatbush avenue extension and Concord street, Brooklyn, N. Y., architect and superintendent of schools, plans installation of mechanical units and power equipment in industrial high school for girls in the Bronx, N. Y.

NEW YORK—National Dairy Products Co., Thomas H. McInnerney president, 120 Broadway, plans to spend $10,000,000 this year on new buildings and equipment, including $1,000,000 for a milk plant in St. Louis.

WILKES-BARRE, PA. — Machine shop and warehouse of the United Motor Parts Co., 163 North Main street, was damaged by fire recently. Thomas Boyle, Harold Cragle, and Carl Reavis are operators of the company.

New Jersey

DOVER, N. J.—Picatinny arsenal, this city, will ask bids Feb. 20, for pipe fittings, under program ER-672-36-229.

HILLSIDE, N. J.—Amersil Co. Inc., 88 Cypress avenue, New York, has taken title to the 1-story brick building on Chestnut avenue and Coit street, this city, and will occupy for the manufacture of fused silica and quartz products. The plant has been used formerly by the Sweet Foundry Co. and General Brass Foundry Co.

JERSEY CITY, N. J.—Charles F. Guyon Inc., 501 Fifth avenue, New York, has purchased the Boynton Furnace Co. plant in the Lafayette section of this city, for the distribution of industrial pipe and fittings. Buyer is moving from smaller factory space in North Bergen, N. J.

LONG BRANCH, N. J.—Clayton & Brower, broker, reports the sale of a tract, 500 x 700 feet, on Prospect, Cleveland, and Poole avenues, this city, to a client who plans to erect a modern bakery with automatic ovens, shipping, packing, and stock rooms, conveying equipment, and handling machinery. Amount involved in the deal was approximately $20,000.

Alabama

BIRMINGHAM, ALA. — W. M. Smith & Co., First avenue, dealer, wants information and prices on contractors equipment, including pavers, rollers, concrete mixers (14-S or larger) and air compressors.

BIRMINGHAM, ALA.—W. M. Smith & Co., First avenue north, dealer wants several miles of 2 and 2½-inch pipe.

Maryland

HUNGER, MD. — B. C. Bell and Luther Mills are making plans for the purchase of transmission, conveying, and power machinery and equipment for installation in their new oyster packing plant.

SALISBURY, MD. — City, Clarke Gardner acting city engineer, plans constructing a new dam in Johnson's Pond, for the purpose of maintaining an adequate head of water, built of concrete steel and approximately 300 feet long. Three hundred thousand pounds of steel piling will be used, with miscellaneous structural steel, and cost will be $28,558. A PWA project.

District of Columbia

WASHINGTON — Navy department, bureau of supplies and accounts, will ask bids Feb. 25, schedule 7194, on forgings and weldment assemblies of steel, delivered at Philadelphia.

WASHINGTON — Department of commerce, division of purchases and sales, New Commerce building, asks bids until Feb. 27 on inventory No. 27783, for a cross wire mounting machine.

WASHINGTON — Navy department, bureau of supplies and accounts, will receive bids until Feb. 28 for a motor-driven pipe threading machine, delivered San Pedro, Calif., schedule 7218; a heavy-duty motor-driven, forging machine, delivered Portsmouth, N. H., schedule 7229; and miscellaneous polishing and buffing lathes, delivered

(*Please turn to Page* 92)

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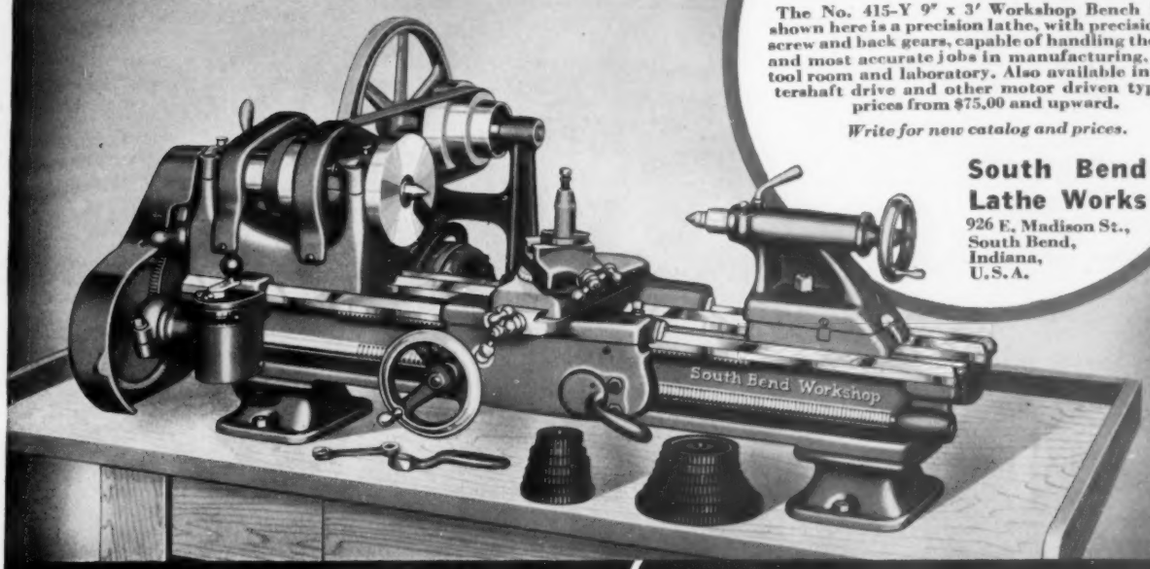

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(*Continued from Page 90*)

Washington, schedule 7240; March 3, for a centerless, motor-driven grinder, delivered Washington, schedule 7219; a universal motor-driven, cutter and tool grinder, delivered Puget Sound, Wash., schedule 7226; March 6, for 15 electric, portable, tool-post grinders, delivered Mare Island, Calif., schedule 7237.

Kentucky

LEXINGTON, KY.—Warner Sayres Inc. contemplates the construction of a warehouse and bulk plant on south Broadway near Bolivar road, for the distribution of petroleum and asphalt road building products. Warner Sayres, 216 Market street, is president.

LEXINGTON, KY.—Blue Grass Aviation Co. has been incorporated by Charles H. Anderson and John Sutherland.

OWENSBORO, KY. — Cable Drilling Co. has been incorporated by H. C. Smith and Walter Sargent.

PADUCAH, KY. — Buildings of the Meyers Paper Co., Dumaine Produce Co., and the H. H. Produce Co. recently suffered severe loss by fire here.

Florida

JACKSONVILLE, FLA. — Rivers Body Factory Inc. has been organized by E. E. Sanders and W. C. Rivers, 1025 North Myrtle avenue.

MIAMI, FLA. — City, William Sydow director of public service, has PWA approval for the following work at the foot of Tenth street: Constructing a complete 2-story warehouse, 60 x 100 feet, to be known as No. 15; automatic sprinklers in warehouse Nos. 13, 14, and 15; five elevators in warehouse Nos. 13 and 14; 21 metal doors in warehouse No. 4; and constructing a complete precooling plant, 45 x 200 feet, in warehouse No. 14.

TAMPA, FLA. — Tampa Lumber & Export Co. has been incorporated by E. L. Roturean and C. C. Watson.

Georgia

ATLANTA, GA. — Seydell-Woolley Co., 748 Rice street northwest, has made plans through Oliver J. Vinour, architect, 1283 North Morningside drive northeast, for the construction of an addition to its present chemical plant.

ATLANTA, GA. — O. B. Andrews Co., Rossville boulevard, Chattanooga, Tenn., has acquired a building on Mechanic street, this city, for future expansion.

SAVANNAH, GA. — Smith & Kelly Co., Central of Georgia terminal, is installing equipment for discharging, weighing, and sacking nitrate of soda.

Louisiana

NEW ORLEANS, LA. — Equitable Equipment Co. Inc., this city, wants prices and information on a 100,000-gallon used steel tank on a 100-foot tower, generators, and fuel diesel engines.

NEW ORLEANS, LA. — Sewerage and water board receives bids April 2 for $800,000 sewerage projects, work to include a $350,000 system in Lakeview section, $225,000 system in Algiers, including the installation of water pipes, 30-inch water main in uptown New Orleans, and a 12-inch water line along Gentilly road.

Mississippi

BILOXI, MISS. — Standard Oil Co. is constructing a wholesale distributing depot at Point Cadet, including four tanks of 315,000-gallon capacity each, to be built at a site on East Beach.

North Carolina

BILTMORE, N. C.—W. C. Zickgraf, Franklin, N. C., has incorporated the Asheville Lumber Co. and will construct a band saw mill here, on West Chapel road, to cost $50,000. Company will erect buildings, install machinery, and a new type Moore dry kiln.

BURLINGTON, N. C.—Duke Power Co. contemplates doubling the present capacity of its gas generating plant on Main street, at a cost of $30,000. C. E. Scott is manager.

CHARLOTTE, N. C. — Mathieson Alkali Works Inc., New York, proposes to establish an office and warehouse in Wade Loft building, 300 East Sixth street, for the distribution of carbon dioxide ice throughout the entire territory south of Washington. C. W. Tiffany, Washington, is manager.

WAYNESVILLE, N. C. — Eureka Mica Mfg. Co. has been incorporated by W. W. Davis and J. W. Cole.

WILMINGTON, N. C.—Taylor-Colquitt Co., J. Marshall Fyre manager, is completing an expansion program at its creosoting plant, Greenfield street. Future plans include the installation of three pumps, a creosoting cylinder, 8 x 130 feet, and a 200-horsepower boiler.

WILMINGTON, N. C.—North Carolina Line Inc., T. D. Lewis president, will double the size of its main terminal warehouse at foot of Ann street, with construction to be of corrugated metal. Work will start in 30 days.

Tennessee

CHATTANOOGA, TENN.—Plant of the Lucey Mfg. Co. has been acquired by the Reynolds Metals Co., 19 Rector street, New York. It will be used as a research factory.

KNOXVILLE, TENN. — Tennessee Valley Authority receives bids Feb. 25 for an air conditioning system, for certain parts of the Norris power plant.

KNOXVILLE, TENN. — Tennessee Valley Authority, Knoxville, will receive bids March 3 for furnishing, fabricating, galvanizing, and delivering steel gratings, floor plates and appurtenances for Pickwick Landing lock; Feb. 27 for furnishing and delivering 161 outdoor disconnecting switches for Norris switchyard.

MEMPHIS, TENN.—General Foods Corp., through Indiana Flour Co., Evansville, Ind., will establish a plant on Linden street and Southern railway for the manufacture of cotton and burlap bags. Company has leased a 2-story building, with 20,000 square feet of space and will install machinery soon. E. A. Igleheart, president of Indiana Flour Co., will have supervision of the plant.

MEMPHIS, TENN. — Parkview Amusement Co. Inc., Joseph Hanover vice president, will erect a $35,000 theatre at 2424 Summer street, 60 x 156 feet. Construction will be of brick and steel, with stainless steel used in lobby, and heating to be of conditioned air, with ventilating system for cooling theatre in summer. R. B. Spencer is architect.

Virginia

LURAY, VA.—Town council is considering the erection of a power plant. Application has been made for a PWA grant. Linzey Lawler is chairman of the town power committee, and a survey is being made by the Scholfield Engineering Co., 1324 Commercial Trust building, Philadelphia.

NORFOLK, VA.—Feed processing machinery is to be installed and fire damage to the building is to be repaired with an expenditure of $25,000 by the J. M. & T. O. Gwaltney Co., 1120 Water street.

West Virginia

BLUEFIELD, W. VA.—Oakwood Smokeless Coal Co., W. W. Wood

(*Please turn to Page 94*)

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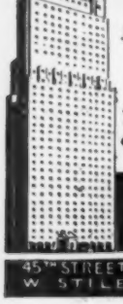

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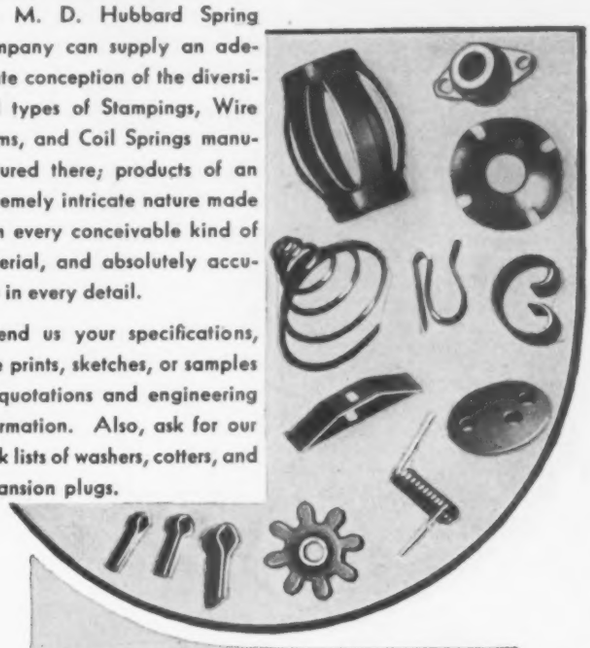

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(*Concluded from Page 92*)

president, plans to develop coal at the mouth of Garden creek on the Levisa river. Initial capacity is 2000 tons daily, and the company will let contract at once for the construction of a tipple, store, miners' homes, and necessary buildings.

CLARKSBURG, W. Va. — National Co., C. E. Margeson plant superintendent, is planning improvements to its plant at Grasselli, near this city.

Missouri

IRONTON, MO.—Hughes Stave & Lumber Co. has been incorporated by Frank and Elwood Hughes, this city.

KANSAS CITY, MO.—Kansas City Public Service Motor Transport Co. has been incorporated by Powell C. Groner and Fred G. Buffe, 519 East Fifty-fourth street.

KANSAS CITY, MO.—Economy Lumber & Material Co. has been incorporated by William King and Walter D. Hull, 814 East Sixty-eighth street.

ST. LOUIS, MO.—New equipment will be installed and a 2-story building at 3216 Locust street recently leased will be improved by the Wholesaler's Clutch Exchange. C. E. Klein, 3213 Locust street, is president.

ST. LOUIS — Simmons-Sisler Printing Co., 208 North Seventeenth street, has acquired a building at 4127 Forest Park boulevard, and will install two offset printing machines at a cost of $50,000, and an air conditioning system to cost $65,000.

ST. LOUIS—Federal court here has authorized the Wabash railroad, Railway Exchange building, to spend $476,694 for repairing 1310 freight cars, and $13,855 for construction of an automatic coal loading station at Pattonsburg, Mo. In addition, receivers have been permitted to dismantle 394 freight cars and 16 locomotives. Missouri Pacific railroad has been allowed expenditures for machine tools during 1936 as follows: Main lines, $117,000; and St. Louis, Brownsville, & Mexico, $5660. The list of tools to be acquired has not been announced.

South Carolina

UNION, S. C.—Union Iron Foundry Co. is making plans for the construction of a foundry here, to cost approximately $37,000 with equipment. Architect has not been appointed.

Oklahoma

BLACKWELL, OKLA. — E. E. Tierney, superintendent of public utilities, will receive bids soon for new pump and motor at diversion dam pumphouse. C. A. Stoldt is city manager.

EL RENO, OKLA. — Consolidated Mill & Elevator Co., El Reno, H. K. Schafer president, plans installation of conveyors, hoists and other mechanical and electric power equipment in new elevator, total cost being $150,000. Horner & Wyatt, Board of Trade building, Kansas City, Mo., consulting engineers.

TULSA, OKLA. — Felix Bodovitz, vice president of Union Transportation Co., has acquired the United Service Co. in this city, and will install a bus line on Main street.

Texas

CORPUS CHRISTI, TEX.—Texon Drilling Co. has been incorporated by J. L. Sullivan and Walter G. Russell.

HENDERSON, TEX. — Parade Gasoline Co., Shreveport, La., J. B. Atkins president, plans a $500,000 addition and improvements to its gasoline absorption plant between this city and London, Tex. Enlargement, to begin in May will include taking of gas from 250 wells and installing a butane extraction unit, increasing capacity to approximately 95,000-gallons daily, and costing $300,000. Work has started on gathering lines to the wells.

HOUSTON, TEX. — Oil Center Tool Co., K. T. Penick secretary-treasurer, 924 Adele street, has completed plans and will soon call for bids for the construction of a $35,000 structural steel plant on Airline drive. Program includes the installation of one 7½-ton electric and two 2½-ton hand powered cranes. Ainsworth & Irvine is architect.

HOUSTON, TEX. — Golden Acres Lumber & Material Co. has been incorporated by Robert J. Levy, and V. B. Mays, 3013 Isabella street.

YORKTOWN, TEX. — PWA has approved of a loan and grant of $100,000 for constructing a light and power plant, including a distribution system. Will call for bids about March 15. Garrett Engineering Co., Box 1726, Houston, Tex., is engineer.

Wisconsin

BARABOO, WIS. — Humane Barn Equipment Co. and Humane Playground Equipment Co., manufacturers of barn and playground equipment, plan construction of a new 1-story factory building.

GREEN BAY, WIS. — Northwest Engineering Co., 28 East Jackson boulevard, Chicago, manufacturer of cranes, derricks and excavators, has awarded contract for construction of a 1-story addition to its factory here, to cost $50,000.

MAYVILLE, WIS. — Mayville Die & Tool Co. has been incorporated by A. A. Mayer, H. S. Thatcher and A. Darst.

MILWAUKEE — Chicago, Milwaukee, St. Paul & Pacific railroad, general offices in Union Station, Chicago, has let contracts for extending the annealing furnace rooms of the West Milwaukee car and locomotive shops.

MILWAUKEE — Briggs & Stratton Corp., maker of automotive switches, small gasoline engines and other products, has purchased the former Milwaukee works of Westinghouse Lamp Co., containing 225,000 square feet, to supplement its present 150,000 square feet. The new space will be used for heavy manufacturing, storage and shipping.

RACINE, WIS. — Pranger Safety Gate Co. has been incorporated to manufacture railway gates, bridge gates and other types of safety gates, by Louis H. Pranger, J. C. Hamata, and Marin J. Clancy.

WAUKESHA, WIS. — E. W. Cox, Fred Baumgart, and W. J. Deakin have incorporated I. B. Rowell Co., to manufacture cutters, harrows, mills and other agricultural equipment.

WAUKESHA, WIS. — Mascot Mfg. Corp. has been incorporated by R. C. Reynolds, E. A. Bornfleth and W. Kraus, to manufacture coal stokers, fuel burning and feeding apparatus.

Minnesota

ST. PAUL — C. T. S. Metal Products Co. has been incorporated by Arthur J. Trepanier and Delores Gerster, for the manufacture of mechanical appliances.

Iowa

ALTA, IOWA — Common council has authorized estimates of cost of extensions and improvements in municipal power and light plant, including new equipment. Buell & Winter Engineering Co., Insurance Exchange building, Sioux City, Iowa, is consulting engineer.

DES MOINES, IOWA—J. D. Adams Co., Indianapolis, manufacturer of road construction and maintenance machinery, has established a factory branch at 1206 Grand avenue to serve Iowa and part of Illinois, and is planning erection of another branch at 2313 First avenue, North, Billings, Mont.

Nebraska

COLUMBUS, NEBR. — Loup river public power district, Harold Kramer, secretary, will receive bids Feb. 27 for ten 4667 kilovolt-ampere, and four 2500 kilovolt-ampere single phase, three winding, forced air-cooled transformers, four 50 kilovolt-ampere, self-cooled transformers for the Columbus power plant; four, 25 kilovolt-ampere, self-cooled transformers, and four, 2500 kilovolt-ampere single phase, forced air cooled transformers for the Monroe power plant. Bids soon will be asked for a 25-ton crane for Monroe power house and a 75-ton crane for the Columbus plant. Harza Engineering Co., 205 West Wacker drive, Chicago, is consulting engineer.

OMAHA, NEBR.—Northern Natural Gas Co. plans to spend approximately $3,250,000 in improvements on its natural gas pipeline in 1936. Plans include construction of a large booster station in southern Minnesota or northern Iowa to pump gas to Minneapolis. Frank H. Brooks is vice president and general manager.

Pacific Coast

HAMILTON CITY, CALIF. — Installation of new equipment is included in the estimated cost of $500,000 for alterations and additions to the refinery at Hamilton City of the Holly Sugar Co., Colorado Springs, Colo. G. J. Dally is manager.

LOS ANGELES — Shell Oil Co., 315 Derby street, San Francisco, plans power station for the new oil refinery at Dorminquez, Los Angeles, and installation of a pumping station and mechanical equipment. Company engineers are in charge of the $1,000,000 project.

SAN FRANCISCO — Pacific Steel Foundry Co., Eighteenth and Treat streets, plans installation of mechanical handling apparatus and power equipment, in addition to rebuilding the plant destroyed by fire.

DAYTON, WASH. — City council is planning to make a survey of the possibilities of a municipal power plant.

SEATTLE — Western Gear Works, 417 Ninth avenue, South, plans a one-story, 56 x 145 feet addition to its main plant.

SEATTLE — Carr Bros. & Wurdemann Inc., 401 East Pine street, with capital of $9000, has been organized by I. G. Carr and associates to manufacture and deal in tools, machinery and accessories.

SEATTLE — George Automatic Train Control Co. is preparing to go into production, naming H. J. Armstrong & Co., 2244 First street, Seattle, to handle manufacture and sales. The control is used on standard air brake equipment.